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Editorial

Plating Withstands Competition

One of the favorite topics of discussion at meetings of platers is the subject of processes, materials and finishes which compete with plating. To some extent these competitors have come into industry because of a real demand for variety and for the properties inherent in these materials. To some extent also competition has been strengthened by inadequate plating. No doubt it was the latter cause which impelled our good friend, *Dr. C. L. Mantell*, to "draw the platers over the coals" (in the words of the last issue of the Quaker City Platers' Reminder) when he addressed a meeting of the Philadelphia Branch A.E.S.

Of the existence of strong competition there is no doubt; plastics, stainless steel and other corrosion resistant materials are too well known to be waved aside. Competition is stern. To say that the plating industry is blind, however, is completely erroneous. We fully appreciate the importance of plastics but we feel, as *W. M. Phillips* stated recently before the Boston Branch of the A.E.S., that plastics are likely to help plating because of the attractive designs possible by the use of combinations of the two. The realization of the plating industry of the importance of good work is conclusively proved by the attention that is being paid—*and the money which is being contributed*—by the industry through the American Electro-Platers' Society—for research at the Bureau of Standards to develop standards and specifications. The opinion is growing also that we are definitely on the way toward a "hall mark" for plating; clear marking on the article showing it to have a superior deposit. Technologically, plating is moving at the highest speed. The Review published in our January issue (pages 8-22) lists a score of very recent developments, the scope of which can be shown by the mention of only a few, such as the use of high current densities to increase plating speeds; cleaning and electroplating of strip in the steel mills; zinc plating of wire in the steel mills, to replace hot galvanizing; color plating; Rochelle salt copper cyanide solutions; synthetic resin finishes; bright plating of nickel and other metals, etc.

And in the last analysis the most convincing argument is that in the face of keenest competition from all sides, electroplating has grown by leaps and bounds. According to the International Nickel Company, nickel plating increased 30% in the United States and Canada in 1937 over 1936.

Competition? Yes. Danger? No! Not so long as the industry protects itself by such eternal vigilance.

A New Metallurgy—Powder

Powder metallurgy, which was the subject of two special sessions at the recent meeting of the Institute of Metals Division, is "new" in the industrial sense. It had its inception just before the beginning of the 20th century but its broad development has taken place only in very recent years. Beginning with the manufacture of tungsten filaments for incandescent lamps from tungsten powder, this process has gone on to other metals, both high and low melting, finding perhaps its most interesting work in the combinations of high and low melting metals so difficult to achieve by melting, although its largest use at this time is probably in the field of bearings.

Like all new developments, powder metallurgy is meeting new problems as it goes forward; for example, the problem of equipment to supply the enormous pressures required to make large objects and the difficulty of obtaining uniform structures in parts with large areas. The advantages of this type of metal products manufacture are so obvious, however, that clearly powder metallurgy is still very young, with a most interesting future before it.

Emergence from Recession

The record of past business declines give us data of some sort upon which to base predictions of the future. It seems that the present recession was much steeper than even the great depression of 1929 and 1930. We have, however, the fact that the index of production showed only a slight further decline from last December to January of this year, and that apparently there has been a still smaller decline from January to February. In other words business indexes seems to give evidence that the decline has been halted.

While there is no proof that the rapidity of the decline and the present stability assures a sharp upturn, we can try to guess from straws in the wind. One straw at this time is copper which seems to be showing definite signs of recovering from its lows. Many informal reports to us indicate that in some quarters at least, light is breaking through the clouds. The volume of such reports is not full enough to be positive but if we had to draw conclusions based on the tone of opinions expressed to us, we should say that business is laying the base for renewed activity and that the latter part of 1938 should see a real revival.

Polishing Technique for Stainless Steel

Great improvement in nine years in technique and equipment. Steel producers turn out vastly better mill finishes.

By C. C. SNYDER and L. N. KOHL

Alloy Steel Divn., Republic Steel Corp., Massillon, Ohio

THE first big finishing job on fabricated stainless steel was done by the Ford Motor Company in 1929 and 1930. In that period radiator shells and head lamp shells were being polished to a high lustre by hand and automatic machine methods. The two mills supplying the steel were furnishing a sheet product—termed No. 1 Finish. This product was hot rolled, annealed and pickled, and lightly cold rolled.

Following the first drawing operation on the radiator shell, the center portion was blanked out and used for the head lamp blanks and miscellaneous parts such as gas and radiator caps, hinges and trims.

By the standards of 1929 the product of the steel mills was considered very good. Today, operators in polishing rooms would look askance were they supplied the same type of material to finish.

Where 80 grit was required in 1930 to remove blemishes from fabricated sheet products, 120 or even finer grit may be employed today. In some jobs where light gauge cold rolled strip is used, and rolled or moulded to section, only buffing operations are required to obtain a bright lustre.

The point the Authors are trying to bring out here is that while polishing technique has been elevated to a much higher plane, due to the development of special grits and compounds, design of machines and other contributing factors, the steel producers have been making rapid strides, too, in improving the mill finish of their sheet and cold rolled strip products. The No. 2-B sheet of today (bright cold rolled) is a far cry from the standard No. 1 of 1929 and the cold rolled strip products, No. 1 and No. 2 finishes, were not even obtainable seven or eight years ago.

Cold rolled strip up to 24″ widths is readily available and is generally used in preference to sheet products in widths of 24″ and less.

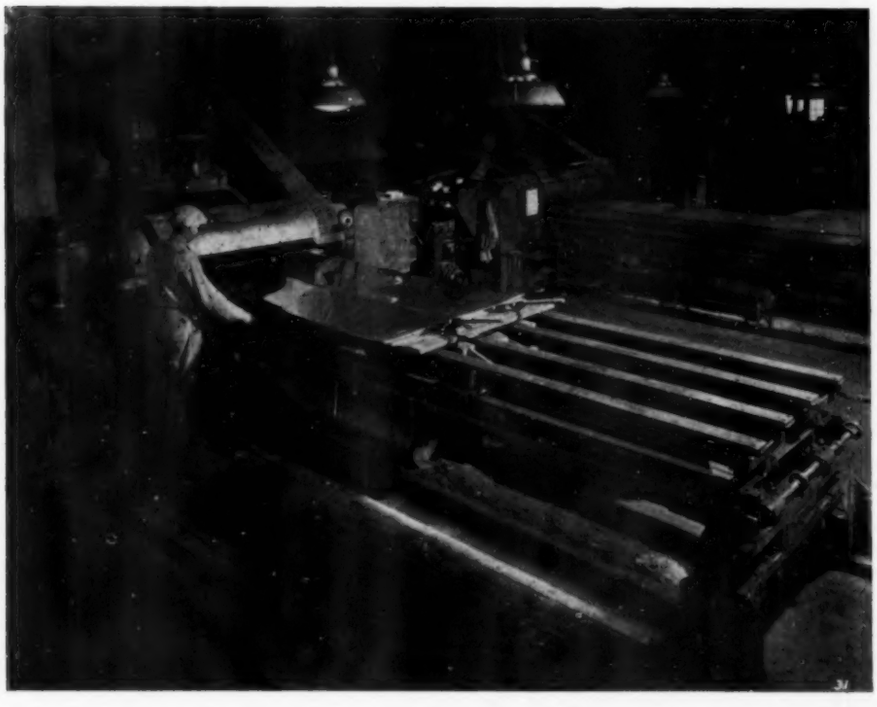

Fig. 1. Polishing a sheet of stainless steel in the Massilon, O., plant of the Republic Steel Corp., Central Alloy Division

Polishing Moulding

Let us, for example, follow a coil of cold rolled strip through a plant manufacturing a moulded section for auto trim. Let us say that the product specified by the buyer is Enduro AA (14 to 18% Chromium) Cold Rolled Strip, No. 2 Finish. In order to avoid marking the strip unduly, precautions are taken wherever possible. There should be a wiper before each roll which lubricates the strip uniformly. For heavy gauge strip, or for difficult and intricate forming, a lubricant having a sulphur base, is generally recommended. For light gauge strip, or for simple forming, a soluble oil may be pumped on the forming rolls.

When the strip is rolled to proper contour and leaves the rolling machine, it is either cut to length at once, or given a preliminary buff before cutting. The buffing wheel should be of a loose muslin or pocket type, the compound of unfused aluminum oxide.

In some shops, after the first buffing operation, the strip is given the final forming operation and then cut to length.

The color buff is generally applied with the same type loose muslin or pocket type of wheel, using chrome oxide rouge or a similarly effective buffing agent. In some cases the finished section is placed on a form for buffing or it may be buffed off hand. The above procedure results in the attainment of a high lustre or mirror finish.

To produce a dull, or satin, finish a greaseless compound on a loose padded buff or a string wheel at reduced speed will give the desired result. With the use of a greaseless compound, the strip or section must be thoroughly degreased before buffing and the operator should use grease free gloves in order to maintain a uniform, unstreaked color. Caution must be exercised in the previous operation to avoid over-heating.

Setting Up Wheels

Much of the success in polishing stainless steel lies in the proper preparation of the wheel,—a typical set-up would be as follows:

Use sewed muslin buff sections, having stitching ½" to ¾" from edge, or cut sewed edges to this depth. Assemble the number of sections necessary to cover the width of the article to be polished. Apply glue on sections of the area adjacent to the arbor hole covering an area equal to the diameter of the thrust washer. Permit glue to cure thoroughly, after which, place the glued sections on the arbor and comb out the surface of the wheel to obtain long shreds. This last step insures a better retention of glue and emery. Apply a sizing coat of glue on the face and permit to dry. After thorough drying or seasoning, the wheel should be again brushed with glue and set up with the grit chosen for the operation.

It is quite important that the wheels and grit be maintained at a temperature approximating 120 deg. F., otherwise, the glue will be chilled, resulting in a disappointingly short wheel life. The glue ordinarily should be maintained at 140 deg. F. If facilities do not permit heating wheels and grit, then raise the temperature of the glue to 160 deg. F. The use of animal hide glue is essential. Bone glue, fish glue, and cold glue preparations are relatively inefficient.

Coarse grains require a higher percentage of glue in the mix than do the finer grains. For average conditions in the polishing rooms, the following table of mixtures should act as a guide for setting up wheels:

Mix by weight and do not heat more than three hours supply.

Size of Grain	*Percent Glue*	*Percent Water*
24- 36	50	50
46- 54	45	55
60- 70	40	60
80- 90	35	65
100-120	33	67
150-180	30	70
220-240	25	75

Soaking the glue allows it to dissolve more readily on heating. Use pure cold water and soak:

Ground Glue—one hour or more
Flake Glue—six hours or more
Cake Glue—twelve hours or more

The glue should be melted in a water jacketed aluminum or copper pot and, as stated previously, should be applied at 140 deg. F., when wheels and grit are preheated to 120 deg. F. If wheels and grit are at room temperature, apply glue at 160 deg. F. temperature.

Breaking In Wheel

Take a round bar or a short length of pipe, and break surface across the face of the wheel. Then use a scrap piece of stainless steel and break in wheel thoroughly to remove loose grit. It is very good practice to use an old emery stone or honing block made from emery to remove the loose grit on the edges of the wheel. Follow this by greasing the wheel while idle.

Greasing

Apply the grease on the face of the wheel, rubbing with a circular motion. Then with a scrap piece of stainless steel, work the grease evenly into the surface. Always be certain that the grease has been uniformly and thoroughly impregnated into the grit to insure a uniform color. The addition of this step will eliminate the tendency of streaking during polishing.

Polishing Deep Drawn or Heavily Fabricated Articles

During fabrication, which may include deep drawing, heavy stamping, spinning and oftimes annealing and pickling operations, the original surface of the sheet or strip as supplied by the mill is destroyed. It is, therefore, necessary to use a grit coarse enough to remove die marks or other imperfections which may be encountered. In any case the finest grit that will make bottom should be used. Ordinarily 120 grease wheel will accomplish the purpose, if it does not, resort to the next coarser grain.

Fig. 2. Gift ware of stainless steel.

The finishing operations can be obtained by using 150 and 180 grease, or a 150 wheel which has been worn down, may be padded by using some whiting or a high temperature melting point tallow. The finish thus obtained will approximate the mill No. 4 Finish and is that finish which is usually found on cooking utensils. Surface speeds of six to eight thousand feet per minute are recommended for cutting wheels.

To increase the lustre of the above, use flour of emery or finer grit, viz 220-320 and 420. A mirror finish is obtained by using the buffing operations outlined for moulded sections, i.e., a cutting buff and a color buff following 220 grit.

Retouching No. 4 Finish Sheets

The greatest percentage of polished sheets shipped by the mill is No. 4 Finish. When it is necessary for a fabricator to touch up areas of such a sheet after performing an operation, a 150 grit greased wheel will match fairly closely. The entire area can then be blended into a uniform No. 4 finish by using 150 or 180 abrasive cloth, soaked in oil, on a hand block and lightly rubbing the entire surface.

Special Wheels

Deviations are often made from the procedure previously mentioned to obtain special finishes. For example, in polishing jewelry or watch cases, a horse hair brush wheel is often employed, with a 200 grit saponified emery cake. The same dull finish is obtainable by using a string wheel, with a greaseless compound. Surface speeds should be maintained at 4,000 to 5,000 feet per minute. To increase the lustre, increase the surface speed.

Hand rubbing operations are occasionally used for blending in. A belt can be used with similar results and is less expensive. Special wheels, made up with rubber and felt to which are applied emery bands, have a very resilient base and are preferred in some plants, although the cost may be slightly higher than for a set up wheel.

Buffing Wheels

For buffing it is essential that a loose muslin or pocket type buff be employed. In order to soften the wheel still further, put a spacer 1/32″ to 1/16″ in thickness, having a diameter equal to the thrust washer between each, or every second or third section, depending upon the degree of softness required. After the sections are mounted it is essential to comb or rake out the surface of the wheel to obtain long shreds which will hold the buffing composition. The buffing compounds applied may be varied according to the finish desired. Usually the base of buffing compound is unfused aluminum oxide for cutting and green chrome oxide or a variation of aluminum oxide for coloring. It is particularly important that no compounds containing iron be used as they may cause a superficial coloring of the surface due to iron particles becoming impregnated on the metal which will result in rusting or staining when the part is put in service, especially if exposed to outdoor atmospheres. This condition cannot, in any sense, be attributed to defective metal. This outlaws the use of ordinary jewelers' red rouge. Important, too, is the need to avoid over-heating. Stainless Steel does not conduct heat away as rapidly as some of the metals, therefore is easier to over-heat if the operator is not careful. Surface speeds should be ten to twelve thousand feet per minute for best results.

Special Cements

If proper temperature and humidity conditions cannot be maintained in the wheel room, it is being found advantageous to use cements. Cements are applied easily at any temperature. Wheels must be free of grease and clean, otherwise the cement will be ineffective. Cements are beginning to find favor in many shops due to the ease of setting up wheels under adverse conditions. Wheels set up with cement can be force dried in an oven.

Fig. 3. Cooking utensils of stainless steel.

Polishing Belts

Belts are obtainable coated with the grits recommended for use with Stainless Steel. The same steps in procedure should be used as suggested for wheels.

Grinding and Polishing Welds

For grinding weld beads, start with a 24 or 36 rubber or bakelite bonded wheel. The weld bead should be so laid that it stands out in relief over and above the base surface. No grinding should be done if the area adjacent to the weld is concave as excessive grinding will be required which will make the finished job too thin in these areas. Flexible shafts and portable wheels are very satisfactory for this operation. The shape and size of the wheel, depends, of course, on the contour of the area to be ground. The rubber or bakelite bonded wheel is

free cutting, will not glaze, and will cut very fast. The first operation should continue until the ground area appears to widen out, indicating the level of the parent metal is reached. A length of 12″ to 18″ should be ground at one time, moving the machine across the surface with sufficient speed to avoid over-heating. Surface speed of wheel should approximate six to eight thousand feet per minute. Flat disc grinders or cup shaped wheels are used extensively for roughing.

The second step should be done with an 80 dry set up wheel. Proceed then with 100 grease—120 grease, etc., until desired finish is attained.

Spot and Projection Welds

For touching up spot welds, a fine grease wheel, such as 180, is generally satisfactory. If heavy and light sections are welded together, a projection type of spot weld is preferred, otherwise burning through the light section is apt to occur. The projection weld will clean up readily with an 180 wheel.

Finish Obtained by Pickling

Attractive finishes may also be obtained by the use of acid pickling solutions. Two effective solutions are listed herewith:

Bright Finish

No. 1— 6% by vol. Nitric Acid
24% by vol. Muriatic Acid
2% Liquid Inhibitor
185 to 190 deg. F.
Wash in hot water.

No. 2—10% by vol. Muriatic Acid
5% by vol. Nitric Acid
2% by vol. Sulphuric Acid
8 CC to gallon of Inhibitor
160 to 180 deg. F.
Wash in hot water.

*General Instructions**

Do not use wheels, buffs, or belts that are contaminated with other metals from previous use.

Do not use buffing or greasing compounds that contain *iron oxide.* Always specify *iron free grits and compounds* for use with Stainless Steel.

*For much of this section we are indebted to Polishing, Buffing and Coloring by R. S. Leather in Platers' Guidebook, 1937 Edition.

Fig. 4. Streamlined Train, Reading R. R., constructed of stainless steel. Built by Edward G. Budd Mfg. Co.

Do not use *turkish emery as a final finishing operation* on Stainless Steel as there is a possibility of iron contamination which will result in discoloration of the metal.

Use rubber or bakelite bonded wheels for rough grinding—built-up wheels for 80 grit and finer abrasive bands or belts are also suitable.

In any polishing or buffing operation it is very helpful if the work can be oscillated, or in the case of continuous buffing, the buffs should be set at an angle. The last buff or finishing operation must, of course, be in a straight line and the last finishing pass must be made in the direction of the rotation of the wheel.

In some types of mechanical work it is possible to set up definite instructions. In the finishing of metals this is an impossibility due to the innumerable variations which are encountered. It is hoped, however, that the technique outlined in the foregoing will act as a general guide and be helpful in producing a better finish at lowered costs.

Tank for Hydrofluoric Acid Pickle

Q.—Kindly inform me on the following. I use hydrofluoric acid for pickling, but seem to have trouble to get the proper pickling tank as the acid eats through and leaks out.

A.—Hydrofluoric acid is the only acid that will dissolve silica. Therefore, if this acid is used for pickling purposes such as for castings, the tank must be made of cypress wood or of acid-proof silica brick faced with special carbon brick.

For a very small tank probably the cheapest and most practical thing is to use a wooden tank or to just build an acid proof brick tank knowing that eventually even this acid proof brick will be slowly dissolved. With cold hydrofluoric acid this small acid proof tank will last very long; with a warm hydrofluoric acid solution that is very weak, say one half of 1% hydrofluoric acid, the tank should last about 1 to 2 years if the solution temperature of pickling bath is not carried over 120 deg. F.

With a hot high strength hydrofluoric acid pickle the acid proof brick will not stand very long so that for this condition the carbon brick lining or facing is recommended. This facing is fairly expensive due to the difficulty of making the carbon brick but the results give a lining which is the only material that will withstand a strong, hot, hydrofluoric acid pickle.

—W. Imhoff.

Nickel on Plumbing Fixtures

The Federal Housing program has put teeth into a federal specification which calls for minimum thickness of plating on plumbing fixtures, as the manufacturers cannot sell their products to government projects unless this specification is met. It calls for an undercoating of at least .00018 of an inch of nickel plating with no less than .000018 of an inch of chromium finish. Thus the nickel base must be ten times the thickness of the chromium "flash" to pass federal inspection.

Better Fire Protection for the Metal Finishing Department

Fire insurance does not cover all losses. The metal finishing room is a major fire hazard.

By **WILLIAM H. EASTON, Ph. D.**

WHENEVER the phrase, "The loss was covered by insurance", is seen in a report on a fire, it is well to remember that it rarely means that all the losses suffered were so covered, especially if the fire took place in an industrial plant.

Ordinarily, this phrase refers only to the damage done to physical property. No mention is made of the loss of income, wages, good will, business opportunities, and many other losses due to the confusion, disorganization, and disruption of service that invariably follow a serious fire. Yet, these losses may be, and often are, greater than the losses of structures, machinery, stock, etc. In fact, they may mean ruin for the business enterprise and destitution for the employees.

Though this stock expression is used by newspapers, fire departments, and others without intent to misrepresent the facts, it nevertheless tends to give many business men a false sense of security. They come to believe that if their property is protected by a fire insurance policy, all losses will be fully indemnified in case of fire.

But they won't be—perhaps not a fraction of them. Fire insurance covers only certain specific losses—and usually only a percentage of those. One hundred percent coverage would be contrary to public interest because it would undoubtedly tend to promote negligence and increase the moral hazard. Only by exercising care and foresight can the individual property owner save himself from irreparable fire losses.

These considerations apply with special force to the finishing department. Because of the unavoidable presence of flammable liquids and combustible dust, the finishing room constitutes a major fire hazard. It is easy for a fire to get started here, and once it gets a good start, it is almost certain to be intense, stubborn, hard to fight, and very destructive.

Statistics on fires in metal working establishments, compiled by the National Fire Protection Association, show that fires in all kinds of metal working plants commonly start in the finishing department, and that for light metal working, which includes sheet metal stamping and working, and the manufacture of such products as automobiles, bicycles, electrical appliances, metal furniture, etc., the finishing department is the most important of all the fire hazards inherent in the metal working process.

Hence, in addition to securing proper insurance, those who wish to keep going businesses from going out of business should take every precaution to prevent fires in the finishing room and to extinguish promptly any that do break out.

The major fire hazards incident to the finishing process center around the store-room for finishes, dipping tanks, spray booths, driers, and ovens. It is impossible to discuss these hazards in detail in a single article, but here are some practical suggestions that will enable interested manufacturers to secure better fire protection for their finishing rooms.

Fig. 1. *Saving their jobs!*

1. *General Fire Protection Information*—Fire insurance organizations have studied the fire hazards of finishing department and have drawn up manuals of approved practices with respect to construction, ventilation, electrical equipment, housekeeping, fire extinguishing equipment, etc.

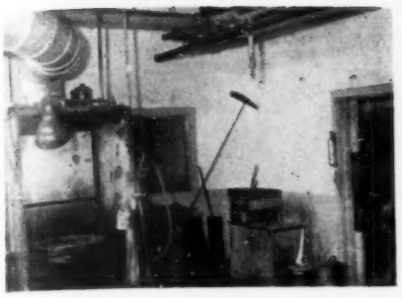

Fig. 2. Spray booth isolated from the rest of the plant in a fireproof room; with sprinkler system and fire door, near which is a vaporizing liquid extinguisher

in finishing rooms. If you are not familiar with the manuals you should obtain copies from your insurance company. It will furnish them free of charge. Besides the regulations you may have to follow in order to keep your insurance in force, you will also find in these manuals constructive suggestions for safety which may not be obligatory in your case but which are well worth following. Also, you may discover that, by some recent change in your processes or arrangements, you have unknowingly vitiated your insurance policy. Such matters should, of course, be rectified before it is too late.

2. *Special Fire Protection Information*—Part of the service your fire insurance company will render you is advise without cost as to the adequacy of your fire protection arrangements.

Fig. 3. Spray booth protected by a nearby large wheeled foam extinguisher

A representative of the company will go over your plant and give you competent advice regarding the construction, equipment, and arrangement of your plant. Take advantage of this opportunity to learn, not only how to secure the lowest rates, but how to obtain the maximum degree of protection against fire.

3. *Fire Extinguishers*—Be sure you have an adequate number of fire

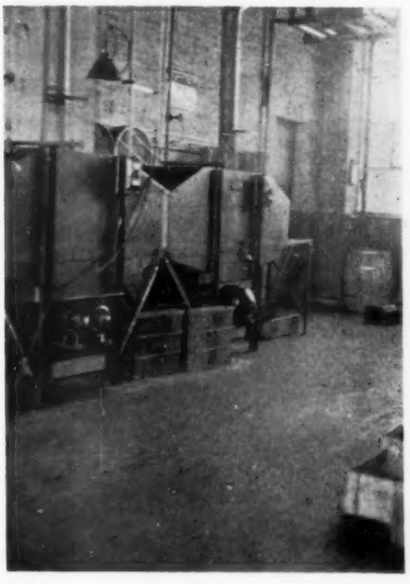

Fig. 4. Fire extinguisher protection for metal cleaning machine, hung at door at a safe distance

extinguishers of the right type, that they are properly charged and ready for instant operation, and that your men know how to use them. Paint the areas, on which the extinguishers are mounted, red or yellow.

A number of disastrous fires have occurred because one or more of these simple precautions were neglected. A shining fire extinguisher hanging on the wall may look well, but, in emergencies, it must not be too far away, nor forgotten, nor out of order, nor incapable of operation by anyone on the spot.

The insurance regulations may call for fixed fire extinguishing systems to safeguard certain hazards and also a certain number of portable extinguishers in various areas. These requirements should be regarded as *minimum*—as all that the insurance companies can reasonably insist upon. But, from your standpoint, better equipment may be highly desirable and may earn you additional reductions in premiums. This point should be given careful consideration.

Inspect your extinguishers every six months.

Soda-acid and foam type extinguishers should be recharged every year, other types according to the underwriters' requirements which will be found on the instruction plates. In recharging, it is always advisable to use units supplied by the manufacturers of your extinguishers. Other materials may damage the extinguisher or in other ways prevent proper operation.

4. *Training*—Be sure that your men know how to operate the fire extinguishers. All portable extinguishers are simple to operate, but each has its own peculiarities.

If you have a large plant, you should organize a plant fire brigade. Suggestions for the organization can be obtained from your insurance company.

In any event, all of your men should be given a practical drill in the use of extinguishers, so that anyone of them can quickly extinguish a small blaze. Certain men should be assigned to particular jobs in case of fire. Especially, all of your night watchmen should be expert in handling extinguishers.

5. *Finally*—Remember that fire insurance policies, no matter how comprehensive, do not cover all losses,

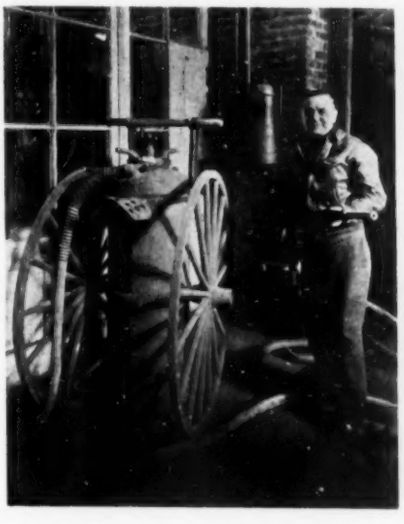

Fig. 5. David Mitchell, "Fire Chief" of Maas & Waldstein Co., lacquer manufacturers

and that, if your business is worth saving, the cost of fire prevention and protection, is an excellent investment.

The pH of Alkaline Plating Solutions

All plating solutions, both acid and alkaline should be operated under pH control.*

By **GEORGE B. HOGABOOM**

Hanson-Van Winkle-Munning Company, Matawan, N. J.

TO OPERATE a nickel solution without knowing the pH value is to invite trouble. If a solution does not plate well the first thing that is investigated is the pH. There is a definite understanding of the results obtained in a nickel solution when the pH value is from 6.6 down to 1.5. The pH range of alkaline plating solutions run above pH 7 has received very little attention, yet it is reasonable to assume that if it is important to operate an acid solution within some prescribed pH range, that it is of equal importance to control the pH of any solution operated above pH 7. Several years ago, in 1929, Dr. R. Semon (B. F. Goodrich Co., Akron, Ohio), with whom we were working on brass plating steel for adhesion of rubber, found that to obtain consistent results it was necessary to control the pH of the brass solutions.

At the A.E.S. Cleveland Convention, in June, 1936, Dr. H. P. Coats (Firestone Steel Products Co.) presented a paper on "Brass Plating for Rubber Adhesion," and recommended that a solution for such work be operated at pH 10.7. He made many experiments with brass solutions of different composition, but always controlled the pH, keeping it between 10.1 and 12.1. The deposits from these solutions were kept as near 70% copper and 30% zinc as possible, as that ratio is required to obtain good adhesion of rubber when vulcanized. As both of these men were interested in the physical properties of the brass deposit, they made no mention of any change in the color of the deposits obtained.

In October, 1936, Dr. Richard Springer (Langbein - Pfanhauser-Werke Co., Leipzig, Germany) published the first paper directly dealing with the pH of alkaline plating solutions. He stated very truly, "Up to today it has hardly been regarded necessary to study alkaline baths with the same viewpoint as nickel plating baths. In the literature there is a decided want of articles on the connection between the method of operation and the pH value of alkaline baths . . . . Scattered experiments with brass baths in practice have shown that the performance of these baths is considerably changed, as a pH value of 10.3 or 10.4 is exceeded."

Dr. Springer made several tests with brass, bronze, cadmium, cyanide copper, and silver baths. An extended abstract of this paper by Dr. Springer was published in METAL INDUSTRY (New York) in April, 1937.

We are indebted to Dr. Springer for the data assembled, as it was very helpful in the investigations that had been started on the same subject and that had for its object the effect of the pH value of alkaline plating solutions on the anode and cathode efficiency. While the color of a deposit from a brass solution is important, the real value of any other plating solution lies in its anode and cathode efficiency. The exception being the chromium solutions in which insoluble anodes are used and the character of the deposited metal is the main objective, regardless of the low cathode efficiency which, however, is a subject that has and is receiving much attention.

The solutions used in this investigation were brass, cyanide copper, cyanide copper + rochelle salts, cyanide zinc, cadmium and silver. The formulas were those that are in "Principles of Electroplating and Electroforming," Blum & Hogaboom, 1930 edition. The solutions were made in one liter glass jars and run in series with a copper coulometer. The anode efficiencies are probably high, as they had a film on them, some very light, others quite heavy, as they came from the solution, and these were washed off before weighing.

To ascertain the most suitable alkali for increasing the pH, ammonium hydroxide, sodium carbonate and sodium hydroxide were tried. It was found that sodium hydroxide was the only chemical whose solution had a pH value sufficiently high so that the dilution of the solution under test was not appreciable. The addition of as much as 43% by volume of concentrated aqua ammonia c. p. did not increase the pH value of a brass solution beyond 12.0; a 15% solution of sodium carbonate has a pH value of 12.2, while a 5% solution of sodium hydroxide has a pH of above 13.6. While it is realized that the use of sulphuric acid cannot be recommended for shop practice, it can be used in experimental work where there is a suitable hood to take off the fumes. In this work sodium hydroxide and sulphuric acid were used so that the composition of the solution would not be materially changed.

All solutions were made with commercial sodium cyanide except the silver solution in which potassium cyanide was used, and therefore potassium hydroxide to change the pH value. Steel cathodes were used except in the silver solution, in which brass cathodes were run after "Striking" them to prevent peeling of the deposit.

All pH measurements were made colorimetrically. The following indicators were used:

Thymol Blue	pH	8.0— 9.6
LaMotte Purple	pH	9.6—11.2
Sulfo-Orange	pH	11.0—12.6
LaMotte Violet	pH	12.0—13.6

*A paper read at New York Convention, 1937, of the American Electro-Platers' Society. This paper won the Proctor Memorial Award.

These were tested in a regular block comparator. In Dr. Springer's work the pH paper was used. While the pH values obtained with pH paper were comparable to those obtained with the comparator, the color of the papers faded very rapidly, which made it difficult to check results. The papers began to lose color in about two minutes, while the solution in the ampoules did not change in two hours.

Cyanide Copper Solutions

The cathode showed an evidence of streaking as the pH was increased. The efficiency at all pH values was above 80% in the solution used. The anode efficiency was over 100% from pH 8.0 to 12.6. At 13.0 it started to drop and at 13.4 the anodes coated over with a green film that increased as the solution was run. The efficiency at the end of the run was 5.9%. This green film on copper anodes in a cyanide solution has generally been attributed to the low free cyanide content. (Fig. 1, Table I).

Table I—Cyanide Copper

FORMULA:	Copper Cyanide—3	oz./gal.
	Sodium Cyanide—4.5	"
	Soda Ash —2	"
	Hypo —1/65	"
TEMP.:	104°F.	
C. D.:	15 amp./ft.²	
TIME:	1 Hour	

pH	Anode Efficiency—%	Cathode Efficiency—%
8.0	102.6	81.8
8.4	102.0	83.3
8.8	102.3	82.3
9.2	101.3	81.0
9.6	101.0	84.4
10.2	100.5	84.8
10.6	102.9	85.7
11.0	102.4	86.4
11.4	102.4	88.2
11.8	101.0	88.9
12.2	101.1	88.9
12.6	101.0	87.4
13.0	99.2	89.3
13.4	5.9	86.3

Dr. Springer found that blisters formed on the cathode in his solution when the pH value was between 9.7 and 10.4. In this work no blistering occurred. This may be due to the difference in the composition of the solutions. This is not possible to determine, as the potassium cyanide content in any of the baths he used is not designated as "combined" or "free"; or, as Coats would rather say, "uncombined" cyanide.

Apparently the best pH range is between 11.0 and 12.2.

Cyanide Copper-Rochelle Salt Solution

This solution is becoming generally used, as it can be operated at a higher current density than a cyanide copper solution. It is strange that this solution has not been investigated and adopted a long time ago. It is called the "Weil" solution by Langbein in his "Electrodeposition of Metals," 1905 edition; Barclay and Hainsworth referred to it in 1912; Dr. O. P. Watts, in his paper on "Cleaning and Plating in the Same Solution" (Transactions Electro-chemical Society, Vol. 27, p. 141, 1915), mentions Weil's solution and found that rochelle salts "cleaned the copper anode."

The cathode efficiency of this solution averaged over 90% in all the runs made. The deposit was clear and free from streaks, although a lighter color was had at a pH value between 9.8 and 10.6 than at a higher pH. At 13.0 the deposit was a dull red.

pH	Anode Efficiency—%	Cathode Efficiency—%
8.2	101.7	88.1
8.6	101.5	88.4
9.0	101.3	89.2
9.4	100.6	92.0
9.8	100.5	90.6
10.2	100.6	91.3
10.6	101.2	92.2
11.0	98.9	92.5
11.4	101.4	92.7
11.8	102.3	94.3
12.2	100.8	94.0
12.6	102.3	94.0
13.0	101.2	94.7
13.4	100.0	93.0

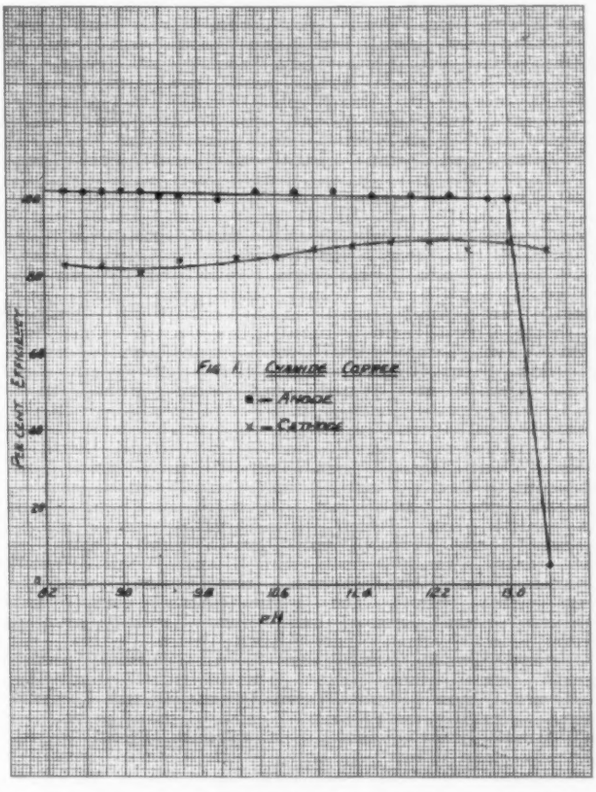

Fig. 1. Cyanide copper

At the lower pH values, i.e., 8.2 to 9.4, the anode started to coat over and cause polarization. (Fig. 2—see page 118) (Table II).

Table II—Rochelle Salt Copper

FORMULA:	Copper Cyanide—6	oz./gal.
	Sodium Cyanide—7.1	"
	Rochelle Salts —6.0	"
	Free Cyanide —0.5	"
TEMP.:	130°F.	
C. D.:	30 amp./ft.²	
TIME:	½ Hour	

Cyanide Zinc Solution

The pH range for successful operation of a cyanide zinc solution is very narrow. While the cathode efficiency is above 98%, the anode efficiency changes rapidly. At pH 13.4 the efficiency is above 100%, yet with a change of only 0.4 pH—13.0—the anodes take on a very dark color and the efficiency falls to 42.5%. When the pH is reduced to 12.6 the anodes coat over with a heavy film that in-

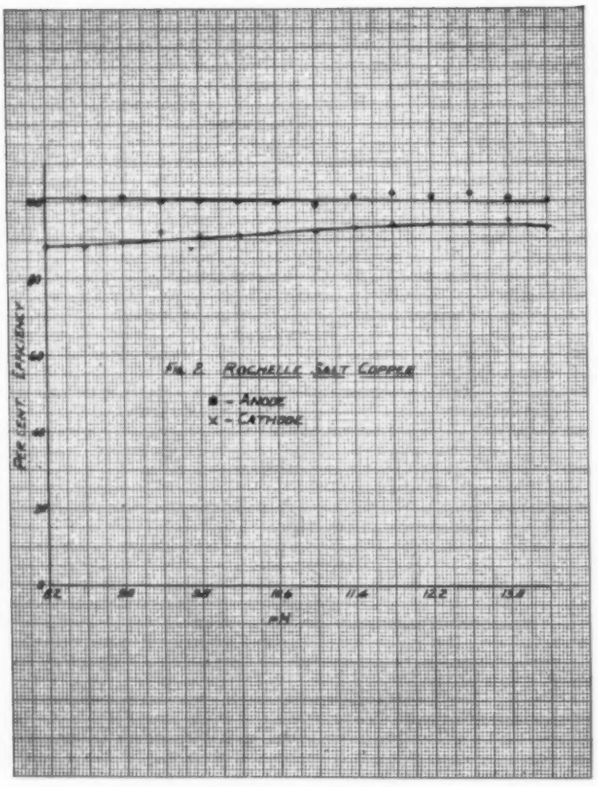

Fig. 2. (Left) Rochelle salt copper

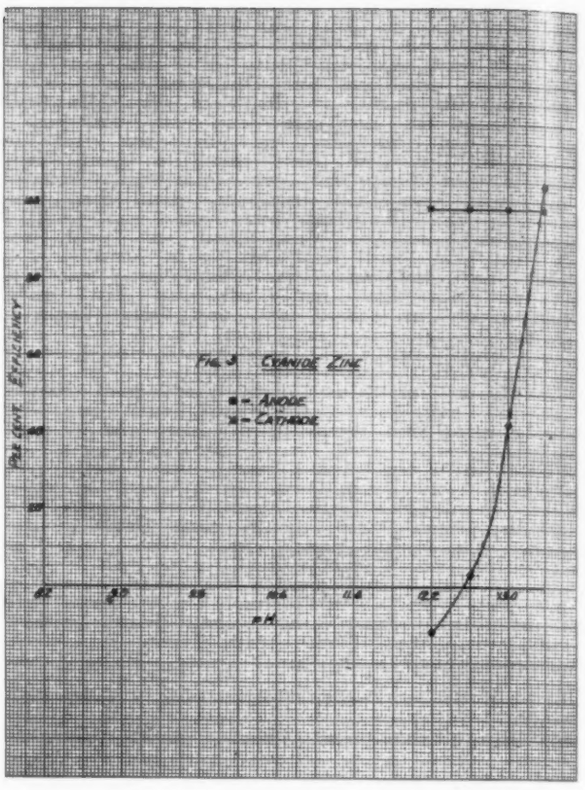

Fig. 3. (Right) Cyanide zinc

creases as the pH is lowered to 12.2 when the efficiency is —13.2%. This figure is due to the heavy adherent coating which increased the weight of the anode. This was true when special alloy anodes, e.g., the zinc-aluminum-mercury alloy, as well as when the high purity zinc was used. With the latter the formation of a sludge was very rapid. These results from the study of the pH values of cyanide zinc solutions were quite upsetting, and duplicate runs had to be made before the data obtained were accepted. The results of this one solution prove the value of pH control of alkaline plating solutions. (Fig. 3—Table III).

Table III—Cyanide Zinc

FORMULA: Zinc Cyanide —8 oz./gal.
Sodium Cyanide —3 "
Sodium Hydroxide—7 "
TEMP.: 70°F.
C. D.: 2.5-15 amp./ft.²
TIME: ½ Hour

pH	Anode Efficiency—%	Cathode Efficiency—%
13.4	104.0	98.2
13.0	42.5	98.2
12.6	3.6	98.2
12.2	13.2	98.9

Table IV—Silver

FORMULA: Silver Cyanide —3.5 oz./gal.
Potassium Cyan.—7.0 "
Potassium Carb.—5.0 "
Brightener—CS_2 Q.S.
TEMP.: 73°F.
C. D.: 5 amp./ft.²
TIME: ½ Hour

pH	Anode Efficiency—%	Cathode Efficiency—%
8.2	70.7	99.8
8.6	101.4	100.0
9.0	102.0	100.0
9.4	105.0	99.7
9.8	101.3	99.9
10.2	101.5	100.0
10.6	100.0	99.3
11.0	101.1	99.5
11.4	101.2	99.3
11.8	102.2	100.7
12.2	102.2	100.8
12.6	102.5	100.8
13.0	100.8	100.2
13.4	94.0	100.1

Table V—Cadmium

FORMULA: Cadmium Oxide— 3 oz./gal.
Sodium Cyanide—13.5 "
Free Cyanide — 9 "
TEMP.: 70°F.
C. D.: 10 amp./ft.²
TIME: ½ Hour

pH	Anode Efficiency—%	Cathode Efficiency—%
8.2	102.7	97.6
8.6	103.0	96.6
9.0	103.8	97.3
9.4	102.8	98.5
9.8	103.2	98.0
10.2	104.3	98.7
10.6	101.4	99.0
11.0	103.3	100.0
11.4	104.1	99.5
11.8	103.0	100.3
12.2	102.8	100.3
12.6	103.8	100.4
13.0	102.4	100.0
13.4	102.2	99.8

Silver Solutions

The permissible pH range of a cyanide silver solution is very wide. The anode and cathode efficiency averages 100% except when the very low pH 8.2 is used. The best results from the physical properties of the cathode were obtained between pH 10.2 and 11.4. At 12.2 the cathodes began to get rough and at 13.0 very dark, even in the presence of the carbon disulphide brightener. At pH 8.2 the anode efficiency was only 70% and a vigorous oxygen evolution was noticeable. A bluish colloidal precipitate formed in the solution, probably due to the attack on the iron anode hook. At pH 10.6 the anode had a highly reflective surface not unlike that had when the free cyanide is high. At pH 11.8 the anode had a spotted appearance. (Fig. 4—see page 119) (Table IV).

Cadmium Solutions

When the pH range of a cadmium solution was between 8.2 and 9.0 the solution was cloudy and the cathode pitted. The best range was between 9.4 and 10.2. From 11.0 to 13.6 the anodes coated over and the cathodes took on a dark color, which became very pronounced at pH 13.4. Regardless of the

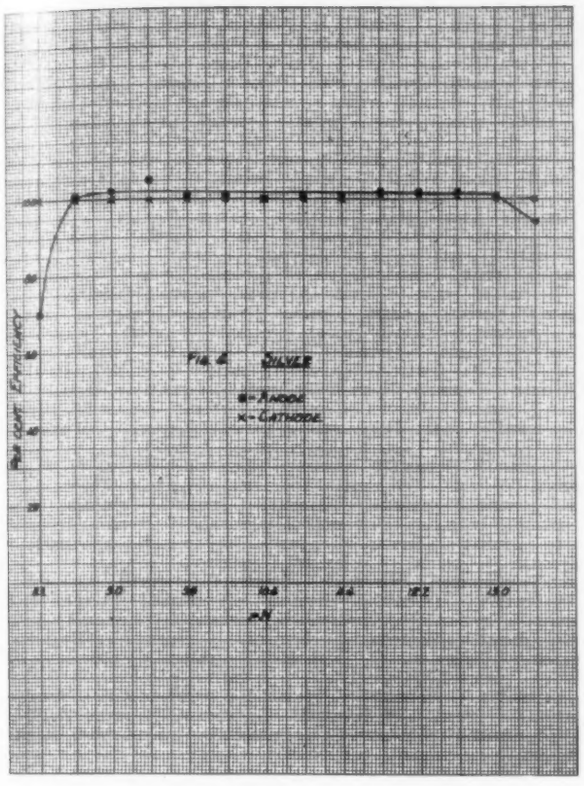

Fig. 4. (Left) Silver

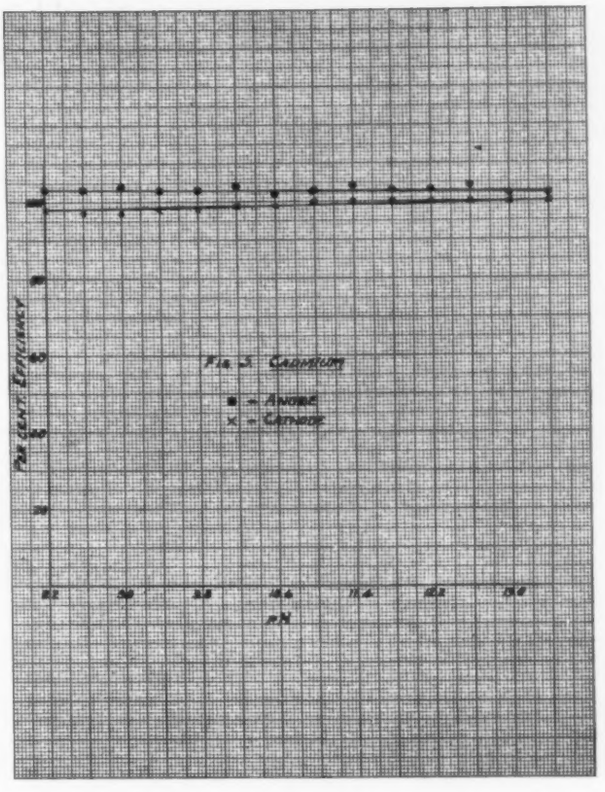

Fig. 5. (Right) Cadmium

pH range, the anode and cathode efficiencies were high. Springer found that the deposit was not adherent unless the pH values of the solution was between 12.0 and 13.0. With the solution used in this work no difficulty was experienced with the adhesion of the deposits. The character of the deposits was effected materially when the pH was between 12.0 and 13.0 especially the brightness which has always been a requisite for an acceptable coating of cadmium. (Fig. 5—Table V, p. 118).

This paper will be concluded in an early issue.

pH of Cadmium Solution

Q.—A case concerns a cadmium plating bath, and consists essentially in adjustment of pH values. In a strongly alkaline cadmium cyanide plating solution, obviously a low pH value can be corrected by the addition of sodium hydroxide (or, possibly, ammonium hydroxide). However, should the pH value be too high (as evidenced by a low throwing power, producing unsatisfactorily dark patches in the coating of concave surfaces), and, presuming that this fault indicates excess of hydroxyl ions, what are the *safest* sources of hydrogen ion concentration? You will understand, of course, that a large bath represents a considerable financial investment, and one must avoid the addition of acidic compounds which might damage the solution for plating purposes.

A.—We suggest using sodium acid sulphate for reducing the pH.

With due caution, dilute sulphuric acid can be used to obtain the desired results more readily. However, in order to check not only the effects of these additions but also as a check on whether the pH adjustment will overcome the faults described (which may also be due to trouble with brightener, or impurities), suggest that you make small scale tests in crocks on the solution in question before treating main tank.

—G. B. Hogaboom, Jr.

Plating Iron on Plaster

Q.—We should like to know if you can tell us how steel can be electrodeposited on plaster paris molds; also possibly on other materials.

A.—A solution for iron plating can be made as follows:

Ferrous chloride	40 ozs.
Calcium chloride	45 ozs.
Water to make	1 gal.

Operate at 195 deg. F. to 230 deg. F.

While the deposition of iron (not steel) can be effected on a practical scale we have no specific data on how the deposition on plaster of paris will work out. Suggest trials be made, metallizing the plaster of paris with bronze lacquer or other standard methods (see 1931 edition of Platers' Guidebook). The high temperature of the iron solution will cause some trouble. To overcome this a room temperature solution as described in the above reference can be used:

Ferrous ammonium sulphate	47 ozs.
Water to make	1 gal.

The solution is kept slightly acid with sulphuric acid, and run at 15-20 amps./sq. ft. —G. B. Hogaboom, Jr.

Nickel Plating Increases

Nickel plating by electrodeposition increased thirty per cent in the United States and Canada in 1937, as compared with the previous year.

If all the nickel consumed in plating within the year 1937 were to have been deposited at average thickness on a single strip of steel, it would plate a path four feet wide around the equator.—Inco.

A Study of the Rochelle Salt-Copper Plating Bath

Part V. The effect of plating variables on the operation of the bath with particular reference to the character of deposits.*

By **A. KENNETH GRAHAM**[1] **and HAROLD J. READ**[2]

THE optimum bath composition and pH have been established in the preceding part of this article. In studying the effect of such plating variables as temperature, current density and agitation, the optimum bath compositions and pH recorded in Table VII were employed. The area of the copper anodes in all cases was sufficiently large to keep the anode current density below the critical value, so that it was not necessary to use any insoluble anode to prevent excessive polarization. In practice, however, a small percentage of the total anode area should be of iron in order to eliminate the possibility of such effects.

Table VII. Optimum Bath Compositions and pH

	Bath 1N oz./gal.	*Bath 5N* oz./gal.
Copper	2.5	3.9
Copper cyanide	3.5	5.5
Sodium cyanide	4.6	6.8
Free cyanide	0.75	0.75
Rochelle salt	8.0	8.0
Sodium carbonate	4.0	4.0
pH (12.2-12.8)	12.7	12.7

Effect of Temperature, Current Density and Metal Concentration on the Cathode Efficiency

In Table VIII the current efficiencies in baths 1N and 5N are recorded at 130, 160 and 190°F for several current densities at a constant pH of 12.7. The effect of current density on the cathode efficiency at the several temperatures is more clearly shown by the curves in Figure 16. It may be seen that the efficiency is always higher in the 5N bath than in the 1N bath for any given temperature and current density. As the current density is increased from 20 to 60

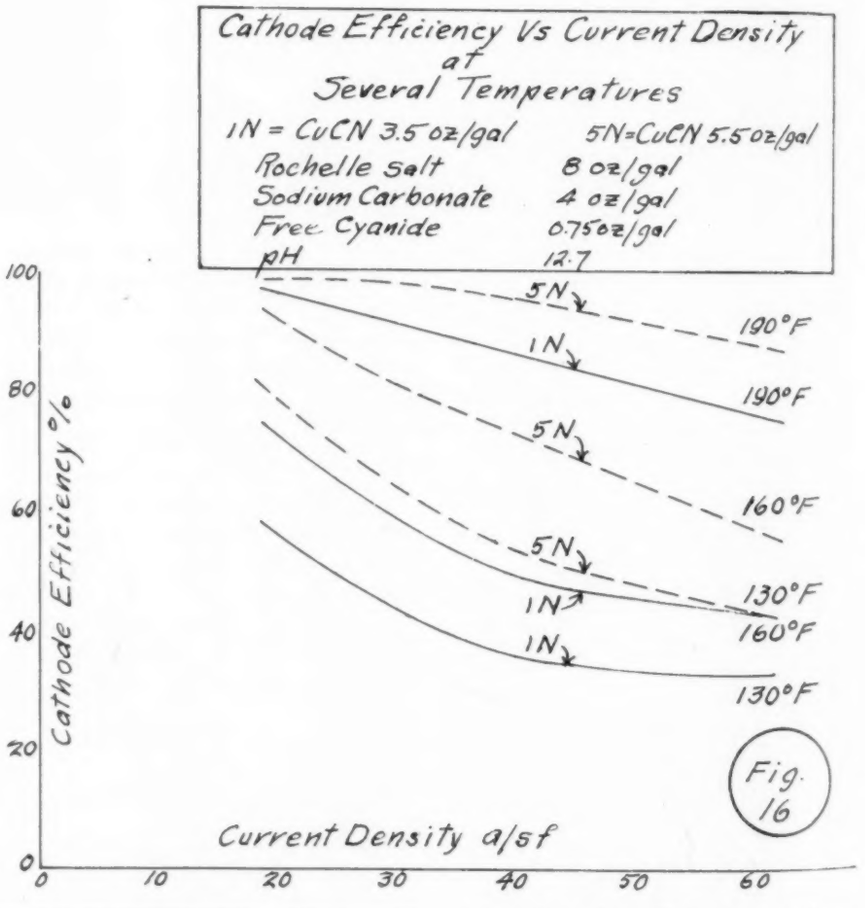

Table VIII. Current Efficiencies at Several Current Densities and Temperatures for Baths 1N and 5N

Bath No.	*Cathode Current Density a./s.f.*	*Cathode Efficiency %* 130°F	160°F	190°F	*Anode Efficiency % C.D. 25 a./s.f.* 130°F	160°F	190°F
1 N	20	56.5	73.2	97.0	...	...	...
1 N	40	35.9	49.3	87.5	49.3	72.2	102
1 N	60	32.9	43.4	77.0	...	...	...
5 N	20	79.0	92.3	99.2	...	...	...
5 N	40	53.7	73.6	96.5	70.5	86.7	102
5 N	60	43.4	57.6	88.7	...	...	...

*Parts 1, 2, 3 and 4 were published in Metal Industry for November and December, 1937; January and February, 1938.

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[2]Present address: Department of Chemistry and Chemical Engineering, John Harrison Laboratory, University of Pennsylvania, Philadelphia, Penna.

a./s.f. the efficiency is decreased and this variation is much less pronounced at the higher temperature (190°F). In all cases the cathode efficiency is unusually high compared to the conventional copper cyanide bath under similar operating conditions.

In Figure 17 the variation of the cathode efficiency with temperature at current densities of 20, 40 and 60 a./s.f. is shown in baths 1N and 5N when operated at a pH of 12.7. As noted above the efficiency increases with temperature and decreases as the current density is raised.

In Figure 18 (p. 122) the variation in cathode efficiency with copper cyanide concentration between the limits of 3.5 and 5.5 oz./gal. is presented for temperatures of 130, 160 and 190°F, current densities of 20, 40 and 60 a./s.f. and a bath pH of 12.7.

It should be noted that it is possible to determine the efficiency at a given current density for the two baths 1N and 5N at three temperatures from Figure 16. It is also possible to determine the cathode efficiency at a given temperature for the two baths at three current densities from Figure 17. It is further possible to determine the cathode efficiency for a given copper cyanide concentration between 3.5 and 5.5 oz./gal. (other bath constituents being constant) at three temperatures and several current densities from Figure 18. It is believed that this data will be of practical value.

Effect of Variables on the Anode Efficiency

The picture at the anode is complicated by the fact that the current density must be kept below the limiting value unless insoluble anodes are used in part. If a small percentage of the anode area is of iron the anode efficiency figures can not readily be interpreted. The anode efficiency of copper in baths 1N and 5N were determined at a pH of 12.7 and at temperatures of 130, 160 and 190°F using an anode current density of 25 a./s.f. The data is recorded in Table VIII and in Figures 18 and 19. It is interesting to note in Figure 18 that the anode efficiency increases with an increase in temperature and that at 190°F the efficiency is 102% for both baths (1N and 5N). Furthermore at 130°F the anode efficiency will be lower, the lower the copper cyanide concentration, but at high temperatures the anode efficiency will be independent of the metal ion concentration within the limits of concentration studied. It should further be noted in Figure 19 (p. 123) that the cathode and anode efficiencies at 25 a./s.f. for bath 5N containing 5.5 oz./gal. of copper cyanide are almost identical and this observation applies for temperatures from 130 to 190°F. The anode and cathode efficiencies at 25 a./s.f. for bath 1N containing 3.5 oz./gal. of copper cyanide are both 50% at 130°F, but at 190°F the cathode efficiency is 95% and the anode efficiency is 102%. This deviation is not serious and the maintenance of either bath is relatively simple as long as the pH and free cyanide concentration are controlled.

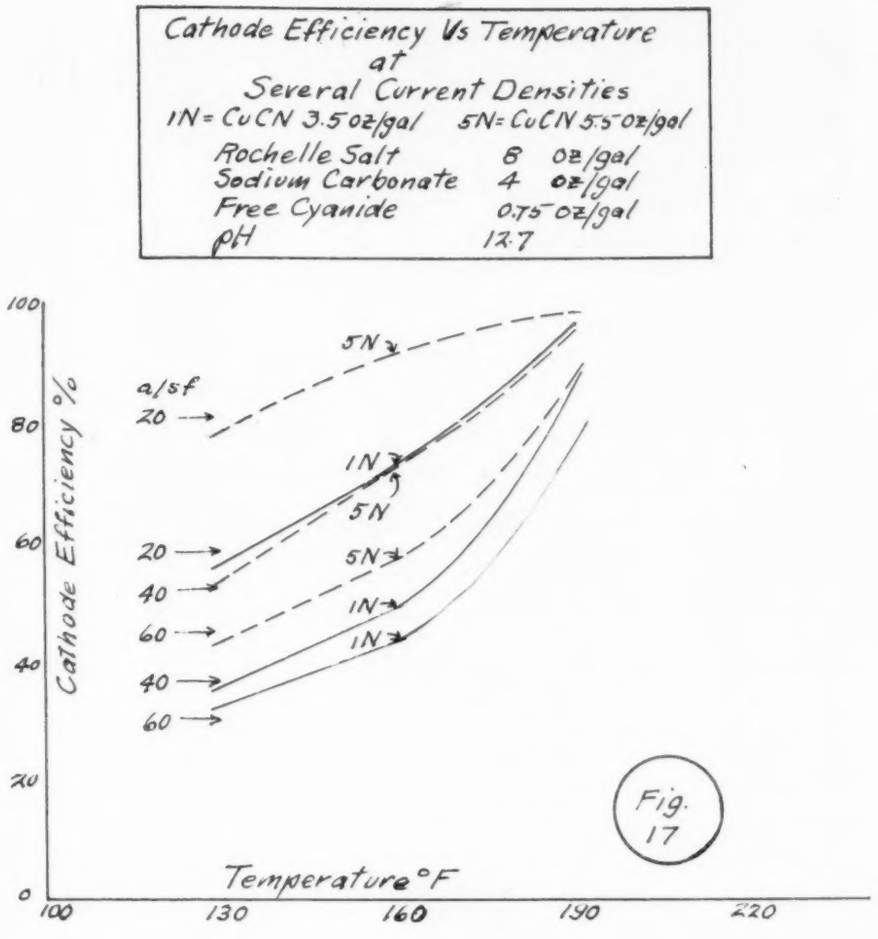


Table IX. Character of Deposits Obtained During Cathode Efficiency Determinations[1]

Temperature—55°C—131°F
Cathode current density—30 a./s.f.
Deposits—30 minutes

Bath No.	*Bath Variables*	*Character of Deposits* pH 10.7	pH 12.8
10	Carbonate—None	pink	pink-red
1	Carbonate—2 oz./gal.	dull pink	semi-bright
3	Carbonate—9 oz./gal.	pink	semi-bright
1	CuCN 3.5 oz./gal.	dull pink	semi-bright
5	CuCN 5.5 oz./gal.	dull pink	dull pink
6	CuCN 7.0 oz./gal.	dull red	dull red
1	Tartrate 4 oz./gal.	dull pink	semi-bright
7	Tartrate 8 oz./gal.	semi-bright	semi-bright
6	CuCN 7 oz./gal., Tartrate 4 oz./gal.	dull red	dull red
9	CuCN 7 oz./gal., Tartrate 8 oz./gal.	dull red	dull red
7	Tartrate 8 oz./gal., Carbonate 2 oz./gal.	semi-bright	semi-bright
8	Tartrate 8 oz./gal., Carbonate 9 oz./gal.	semi-bright	semi-bright
1	Free cyanide 0.75 oz./gal.	dull pink	semi-bright
2	Free cyanide 2.0 oz./gal.	semi-bright	pink

Note 1—Deposits heavier than commonly employed in practice.

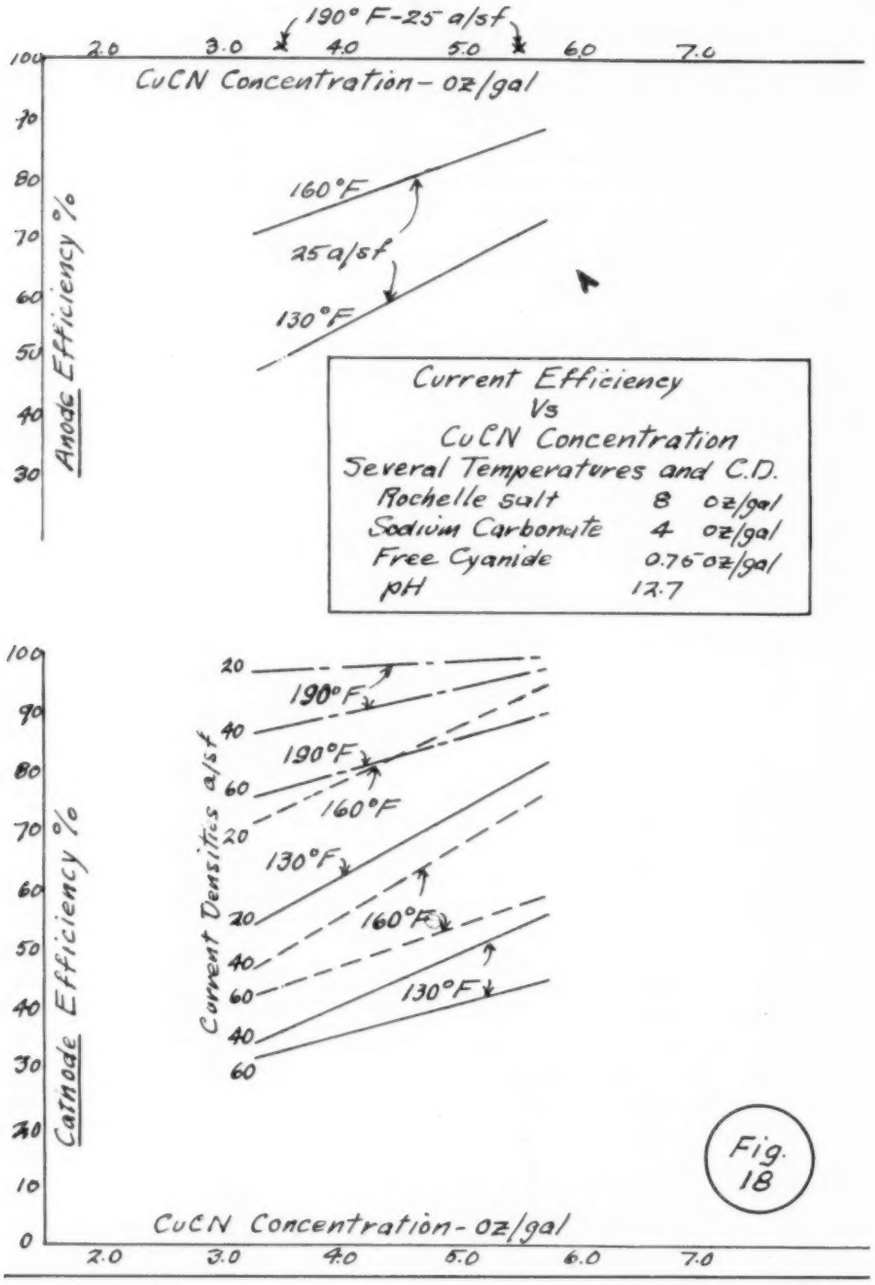


Table X. Effect of Bath Composition and Current Density on the Appearance of Deposits from Rochelle Salt — Copper Baths.[1]

Bath No.	*Variable*	*Agitation*	*Character of Deposits*[2] *(.0003 inch)*[3] *Current Density—a./s.f.*		
			20	60	100
1	Standard Composition	None Yes	sb	p	p
2	Higher free Cyanide	None Yes	sb	p	p
3	Higher Carbonate (9 oz /gal)	None Yes	lp	p	p
5	CuCN (5.5 oz /gal)	None Yes	r r	r dp	rs dp
6	CuCN (7.0 oz /gal)	None Yes	r lp	r dp	rs dp
10	No carbonate	None	dp	p	p

Note (1)—ph in all cases was 12.8 and temperature was 131 deg. Fahrenheit.

Note (2)—Letters have the following meaning:

sb —semi-bright
p —pink, uniform
r —red
rs —red spotted
lp —light pink
dp—dark pink

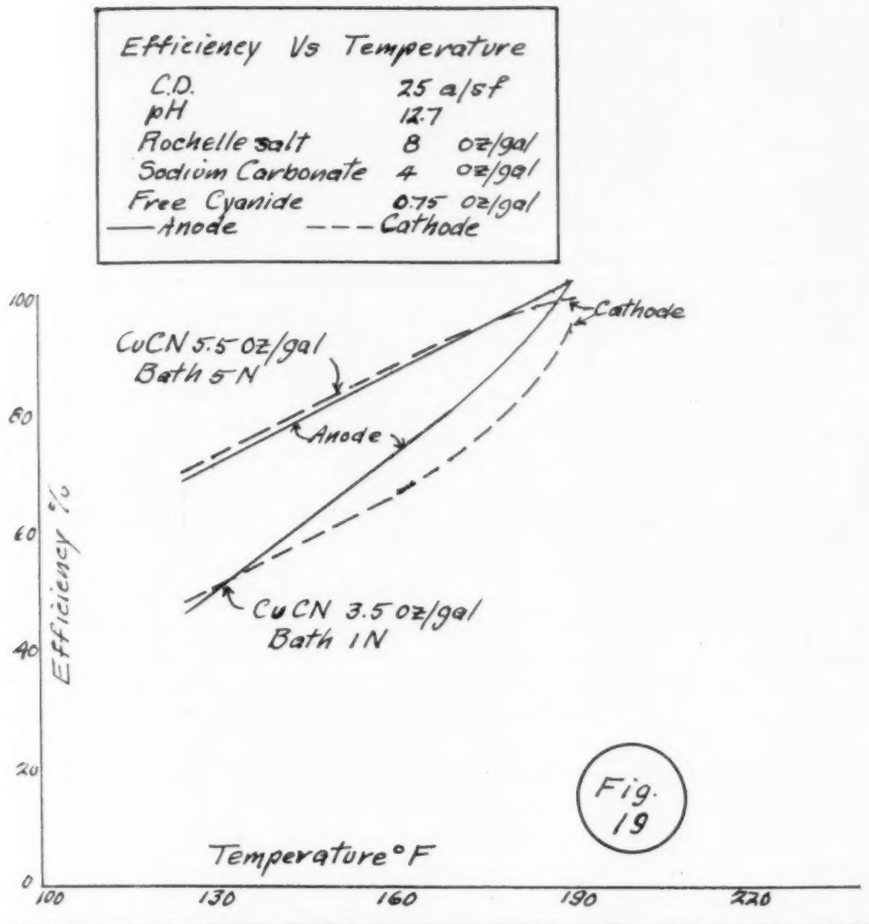
Note (3)—Twice the theoretical time to give .0003 inch deposits was used.

Effect of Variables on the Character of Deposits

In Table IX the character of deposits obtained during efficiency runs of 30 minutes duration at 30 a./s.f. and 131°F are recorded, for pH values of 10.7 and 12.8. Even though these deposits are heavier than those used commercially it is evident that the best deposits are obtained at the higher pH. The low metal bath (3.5 oz./gal. CuCN) gives better deposits than the higher concentrations. Carbonates improved the deposits, but the amount of carbonate and Rochelle-salt is apparently not critical.

The above observations are only general. To more accurately evaluate the effect of variables on the character of deposits further data was obtained for a thickness of about 0.0003 inch. In Table X, for example, the effect of bath composition is shown for current densities of 20, 60 and 100 a./s.f. when operating at 131°F and a pH of 12.8. The higher metal baths (Nos. 5 and 6) give darker deposits. The lower metal bath gives excellent deposits with a suggested bright range below 60 a./s.f. at the temperature employed. The high cyanide bath (No. 2) is not recommended, nor is the carbonate free bath (No. 10).

Bath No. 1 was next studied at five pH values and current densities of 20, 40 and 60 and 80 and 100 a./s.f. as recorded in Table XI (p. 123). The temperature was maintained at 131°F and deposits 0.0003 inch in thickness were prepared both with and without agitation. The superiority of the deposits at a pH of about 12.8 is evident. Semi-bright deposits on cold rolled steel cathodes were obtained at 20 and 40 a./s.f. and agitation raised this bright



range to about 40 and 60 a./s.f. The semi-bright deposits recorded in a few cases at 80 and 100 a./s.f. are due to thin deposits resulting from lowered cathode efficiency. They may, therefore be disregarded.

In Table XII the effect of temperature on the character of deposits obtained from bath No. 1, when operated at a pH of 12.8 and several current densities, is recorded. As would be expected the effect of both temperature and agitation is to shift the range of current density for semi-bright deposits. At temperatures of 131 to 160°F semi-bright deposits will be obtained between the limiting current density values of 20 to 60 a./s.f. The best value must be judged by the operator, depending upon the temperature employed, the degree of agitation, the character of the work being plated, and etc. A temperature of 140 to 160°F and an average current density of 45 a./s.f. has been recommended by some operators and these values represent good averages.

Discussion of Results

Baths 1N and 5N both give very satisfactory deposits at high current den-

Note (1)—Bath No. 1 containing:

CuCN	3.5 oz /gal
NaCN	4.6 oz /gal
Rochelle Salt	4.0 oz /gal
Soda Ash	2.0 oz /gal

Note (2)—Letters have the following meaning:

p —pink uniform
pr—pink, red centre
sb—semi-bright
dr —dark red
dp—dark pink
r —red

Note (3)—Twice the theoretical time to give .0003 inch deposits was used.

Table XI. Effect of pH and Agitation at Various Current Densities on the Appearance of Deposits from a Rochelle Salt-Copper Bath[1]

pH	*Agitation*	*Character of Deposits[2] (.0003 inch)[3] Current Density—a./s.f.*				
		20	40	60	80	100
13.3	None	pr	p	p	p	sb
12.8	None	sb	sb	p	p	p
	Yes	dp	sb	sb	p	p
12.3	None	pr	p	p	p	p
	Yes	dp	p	p	p	p
11.8	None	pr	p	p	p	p
	Yes	dp	p	p	p	p
10.7	None	dr	pr	pr	sb	sb
	Yes	dr	dp	dp	p	p

Note (1)—CuCN 3.5 oz /gal
NaCN 4.6 oz /gal
Na_2CO_3 2.0 oz /gal
Rochelle Salt 4.0 oz /gal
pH 12.8

Note (2)—r —red
sb —semi-bright
p —pink
dp—dark pink
lp —light pink

Table XII. Effect of Temperature and Agitation on the Character of Deposits from Bath No. 1[1]

Temperature	*Agitation*	*Character of Deposits[2] (.0003 inch) Current Density—a./s.f.*			
		20	40	60	100
100	No		r		
	Yes		r		
131	No	sb	sb	p	p
	Yes	dp	sb	sb	p
160	No	dp	sb	lp	p
	Yes	r	dp	lp	p
190	No		p		
	Yes		p		

sities and with relatively high efficiencies. Where the lustre of the deposit is not a factor heavy deposits can rapidly be obtained using a high temperature (190°F) and high current densities (60 to 90 a./s.f.) from either of the above baths. Where lustre is a factor, as in the plating of die castings prior to nickel and chromium finishing, the lower metal bath (1N) gives better results. In such a case the conditions that apply might be summarized as follows:

Temperature—°F	140 to 160
Cathode C.D.—a./s.f.	20 to 60
Cathode efficiency—%	50 to 70
Anode C.D.—a./s.f.	25

Whether an insoluble anode should be employed or not depends on whether the anodes tend to polarize excessively at the current densities employed and whether the maintenance of a metal balance in the plating bath requires a reduction in the soluble anode area. In any event it is good practice to have a small insoluble (iron) anode area, probably less than 5%, to prevent excessive polarization and to insure uninterrupted operation.

Analysis for Rochelle-Salts

Several methods of analysis for Rochelle-salts in copper plating baths have been recommended. When applied in practice it has frequently been found that iron in the plating bath interferes with the analyses. The method that has been found best, from this point of view, is that developed or modified by *Myron Diggin* of the Hanson-Van Winkle-Munning Company. It must be stated, however, that if the iron in the plating bath is as high as 0.6 oz./gal. or if care is not exercised in carrying out the details of the method, iron will interfere with the determination. It was at the suggestion of one of the authors that Mr. Diggin kindly consented to further investigate this feature and the method now recommended, with the necessary modifications to prevent the interference of iron, is recorded below.

1. Fill the sampling burette with the solution to be tested. Run a 10cc. sample into a 250cc. beaker.

2. Add 10cc. concentrated HCl, 15cc. distilled water, and boil until liquid is greenish in color and free from turbidity.

3. Warm and add 10cc. of a 15% solution of sodium sulphide while stirring, let settle keeping warm and filter. (The solution is normally acid at this point and only copper sulphide is precipitated, iron if present remaining in solution.) Wash the precipitate with small amounts of distilled water to which a few drops of sodium sulphide have been added and sufficient hydrochloric acid to render the wash water acid to litmus paper. (Care should be exerted to keep the copper sulphide precipitate covered with wash water in order to avoid oxidation of the sulphide to sulphate during washing. If sulphate is formed in this manner it will dissolve and run through the filter into the filtrate. Since the latter has an excess of hydrogen sulphide the copper will again precipitate as sulphide. Any time this is observed the filtrate should again be filtered through a fresh filter to avoid copper interferring with the Rochelle Salt determination.)

4. Boil the filtrate which has been collected in a 250cc. beaker until its volume is reduced to approximately one-third and add 35% potassium carbonate solution until alkaline to litmus.

5. Evaporate until volume is reduced by one half. (If any sulphur precipitates at this stage filter before proceeding.) Add glacial acetic acid until solution is just acid to litmus.

6. Continue the evaporation until the volume has reached 20 or 25cc., remove from the hot plate, stir in 7cc. of glacial acetic acid, and let stand 15 minutes with occasional stirring.

7. Add 100cc. of 95% ethyl alcohol and let stand 15 minutes with occasional stirring.

8. Filter and wash four times with 25cc. portions of ethyl alcohol or until liquid draining from funnel is neutral to litmus. (The ethyl alcohol will dissolve and wash away iron salts which might be contaminating the precipitate provided the concentration of iron in the sample is not excessive.)

9. Transfer filter paper to the beaker in which the precipitation was made, add 150cc. distilled water, 5 drops of thymolphthalein indicator, and heat to boiling.

10. Titrate with 0.1N sodium hydroxide until one drop produces a faint blue color. The number of cc.'s multiplied by 0.378 equals the ounces per gallon of Rochelle-salts in the plating solution. (If the alcoholic washing under 8 has been carelessly done, or if the iron present in the sample is excessive, the titration with sodium hydroxide will precipitate the iron which has contaminated the potassium acid titrate. The results of the titration under these conditions will be of questionable value.)

The above procedure is limited in two respects.

In the first place if the Rochelle Salt concentration is greater than six (6) oz. per gallon, the amount of precipitate which is involved is too great. In this case it is recommended that the sample for analysis be reduced to five (5) instead of ten (10) cc.

The second limitation has to do with the effect of iron. If the iron concentration in the plating bath is greater than 0.5 oz. per gallon it will interfere with the end point. Where such is the case reducing the volume of the sample to a point where the iron concentration will not exceed 0.5 oz. per gallon will rectify this situation.

It should be remembered that contamination of the bath with iron can largely be prevented if the pH is maintained at the values recommended and providing the carbonate concentration of the bath is at least two (2) oz. per gallon.

Acknowledgement

It would be extremely difficult to render due acknowledgment to any one individual for specific assistance in carrying on this study. However, it would be a serious omission should the authors fail to acknowledge their indebtedness to Dr. Heussner of the Chrysler Corporation, Dr. Fritz and Mr. Nixon of the Ternstedt Mfg. Co., and Mr. Diggin and Mr. Hogaboom of the Hanson-Van Winkle-Munning Company, for their willingness to discuss experiences with the Rochelle-salt copper bath prior to undertaking this investigation.

Rhodium Plated Road Signs

A new night highway sign uses rhodium plating for its letters which shine when automobile headlights strike them. Rhodium is a sister metal of platinum, being valuable especially for its qualities of high reflectivity and non-corrosion.

Institute of Metals Features Powdered Metals

Annual meeting with sessions on precious metals, properties and uses of metals, deformation and recrystallization and two special symposia on powdered metals.

THE Annual Meeting of the Institute of Metals Division, A.I.M.E. was held in New York, at the Engineering Societies Building, 29 W. 39th St., February 15-18. The papers read covered a wide range of metals and alloys with special attention paid to powdered metals.

Among the papers read were the following:

Powder Metallurgy, its Origin and Past Development, by *Charles Hardy*. A review: history; production of the powder, mixing metal powders; compression into commercial forms; heat treatment; difficulties; industrial applications; advantages; future prospects.

Production and Some Testing Methods for Metal Powders, by *D. O. Noel, Jr., J. D. Shaw* and *E. B. Gebert*. Details of methods of production: machining, milling, shotting, granulation, atomizing, condensation of metal vapor, reduction of oxide powders, chemical precipitation, electrolytic deposition, sintering, formation of an alloy followed by dissolving one of the alloying constituents. Testing methods: density, particle size distribution, microscopic measurement, Wagner Turbidimeter testing, Roller Air Analyzer Testing.

Calcium Metallurgy, by *C. L. Mantell* and *Charles Hardy*. A review: physical and chemical properties; operating details for electrolytic production; industrial applications, including production of chromium-thorium-uranium metal powders, debismuthizing of lead, calcium-lead alloys, deoxidation of copper and its alloys, addition agent with aluminum, magnesium, beryllium, nickel-chromium, precious metals, etc.

Indium-Treated Bearing Metals, by *C. F. Smart*. Indium, a silvery appearing soft metal, known for some seventy years simply as a very rare element delectable by means of the spectroscope in zinc ores has been within the last few years mined and produced in quantities that make it available for commercial use. This commercial production of indium is due very largely to patience and efforts of William S. Murray of Utica, N. Y. In the research laboratories of the Pontiac Division of the General Motors Corporation, C. F. Smart has developed a method of plating indium on the bearings of automobile crankshafts and connecting rods and finds that this indium treatment almost completely avoids a troublesome corrosion to which these bearings have hitherto been subject.

The Nature of Metals as Shown by their Properties Under Pressure, by *Prof. P. W. Bridgman*. Annual Institute of Metals Division Lecture.

Conversion of nonmetallic chemical elements into materials having properties of metals, and the production of new forms of metals with new properties, in each case by the application of extreme high pressure, sometimes as high as 750,000 lbs. per square inch. It has been possible to increase the working range of his experimental apparatus from an upper limit of about 20,000 atmospheres pressure to as high as 50,000 atmospheres, equivalent to about three-quarters of a million pounds per square inch. At these extreme pressures the element tellurium, an element rather closely related to sulphur and lacking in metallic characteristics under ordinary conditions, takes on properties which are truly metallic.

Many metals change to allotropic forms on heating or cooling under the usual atmospheric pressures. Many of the most useful properties of metals and alloys are based on such changes. It is possible to produce allotropic modifications, forms of the metal which have not hitherto been known, in the case of bismuth, gallium, calcium, strontium, barium and caesium.

Interesting recent advances in knowledge of allotropic forms of metals at high pressures have been

ROBERT F. MEHL
Chairman, Institute of Metals Division

ROBERT H. LEACH
Vice-Chairman, I.M.D.

possible because of ingenious developments in the construction of steel cylinders to hold high pressures and because of the development of a new type of alloy for the compression pistons.

The new material for compression pistons that improved immensely on the compressive strength of hardened steel is the sintered tungsten carbide alloy—carboloy—which is familiar to metallurgists from its use for cutting tools used for dies.

Types of Metal Powder Products—A Classification, by *Gregory J. Comstock.*

There is a growing interest in the possibilities which are represented by the manipulation of metal powders which justifies an attempt to summarize their potential value. The powder process presents a means of manipulating highly refractory metals which cannot be cast and formed in the usual melting and casting process. Metal powder technique permits the formation of aggregates in which the physical characteristics of the individual metallic components are maintained practically unchanged. The use of metal powders promotes the formation of unusual structural effects which do not result from other methods. The manipulation of metal powders permits alloying by dispersion or localized fusion between adjacent particles and the production of alloy parts or articles which are practically in their final form. Metal powder methods are not subject to some of the limitations of melting and casting. In some cases, metal powder production is more economical than other methods.

E. A. ANDERSON
Member Executive Committee

An Investigation of Wire Bars of Electrolytic Copper, by *M. G. Corson*, consulting engineer, New York.

The purpose of this investigation was to establish the picture of the distribution of physical characteristics through the body of various wire bars. The basic material investigated was cathode copper and a study was made of electrolytic tough pitch copper and oxygen free high conductivity copper, comparing bulk densities, local density variations, tensile strengths, elongations, area reductions, impact resistance, qualitative observations, etc. To a considerable extent OFHC copper showed better properties than the tough pitch bar.

Additional Papers

Cemented Tungsten Carbide Alloys, by *W. P. Sykes.*

Tantalum Carbide Tool Compositions, by *Philip M. McKenna.*

Types of Metal Powders—a Classification, by *Gregory J. Comstock.*

Ductile Tantalum, Columbium and Molybdenum, by *C. W. Balke.*

Rates of Diffusion in the Alpha Solid Solutions of Copper, by *Frederick N. Rhines* and *Robert F. Mehl.*

Measurements of Internal Friction in Age-Hardening Alloys with a Modified Torsion Pendulum Apparatus, by *R. A. Flinn, Jr.* and *John T. Norton.*

Strain Transformation in Metastable Beta Copper-Zinc and Beta Copper-Tin Alloys, by *Alden B. Greninger* and *Victor G. Mooradian.*

Deformation of Beta Brass, by *Alden B. Greninger.*

An Investigation of Wire Brass of Electrolytic Copper, by *Michael G. Corson.*

Solid Solubility of Mercury in Silver and in Gold, by *H. M. Day* and *C. H. Mathewson.*

The Gold-Aluminum System, by *Arthur S. Coffinberry* and *Ralph Hultgren.*

Properties of the Platinum Metals, II. Tensile strengths of platinum and several of their commercial alloys at elevated temperatures, with a few notes on high-temperature corrosion of platinum, by *E. M. Wise* and *J. T. Eash.*

Creep and Fracture Tests on Single Crystals of Lead, by *John B. Baker, Bernard B. Betty* and *H. F. Moore.*

Studies Upon the Corrosion of Tin, I. Potential Measurements on High Purity Tin in Carbonate Solutions, by *Gerhard Derge.*

The Yield Point in Metals, by *M. Gensamer.*

The Aztecs and Their Civilization, by *George C. Vaillant.* A talk at the Annual Institute of Metals Division Dinner.

New Officers Elected

The following officers were elected by the Institute for the year 1938:

Robert F. Mehl, Chairman
Carnegie Institute of Technology
Robert H. Leach, Vice-Chairman
Handy & Harman
E. M. Wise, Vice-Chairman
International Nickel Co.
E. A. Anderson, Executive Committee
New Jersey Zinc Co.
D. L. Colwell, Executive Committee
Stewart Die Casting Corp.
W. P. Syker, Executive Committee
General Electric Co.

Institute of Metals Division Award

The Institute of Metals Division Award for 1938 for an outstanding contribution to metallurgy, was presented at the annual dinner on Friday, February 17th, to *Dana W. Smith* and *W. L. Fink* of the *Aluminum Company of America*, for their paper entitled, "*Age Hardening of Aluminum Alloys*". *I. Aluminum-Copper Alloys*, published as TP 706—Transactions A.I.M.E., 122, pages 284-293, 1936.

W. P. SYKES
Member Executive Committee

Steel for Plating Purposes

Savings in labor cost, overhead, metal deposited and rejections by specifying properly finished base metal.*

By FREDERICK FULFORTH

Supervisor of Finishing, Proctor & Schwartz, Inc., Philadelphia, Pa.

IN THE writer's position and in contacts as consultant to various firms, one of the ever-recurring problems for low costs and fine plated finish on steel can be traced to improper specifications—or to improper press shop methods.

Several years ago it would have been impossible to do with strip steel what the plater is doing today, but such vast forward strides have been made by rolling mills that it is now possible to consistently procure steel which is of a specification so that no polishing is required previous to plating, even when considerable working is necessary in the manufacture of the part; and there is no reason why all platers should not know this and understand how to order steel for the utilization of these advantages.

In the first place, if you have to order steel on a price-per-pound basis do not bother to finish the next paragraph, but if open for conviction, consider a common round flanged lid of .037″ strip stock weighing, when finished, one pound.

If cheap cold rolled strip is used for this purpose, the cost of material is probably in the neighborhood of 3/12 to 4 cents and press operations of combination blank and form followed by trim and then punch would approximate six dollars per thousand or 6/10 of a cent each. Now with this grade of stock you will find it necessary to polish all over the piece for not less than 3 cents, based on the polisher earning $1.00 per hour. In nickel plating, you will require a good .001″ of nickel in order to give the buffer plenty of material to cover the remaining polishing scratches, which buffing will run a minimum of 1½ cents on the same hourly basis as the polisher.

Adding all together you have a total material and direct labor cost of:—

Material	.035
Press Operations	.006
Polishing	.030
Buffing	.015
TOTAL	.086

Now instead of buying 3 to 4 cent stock, let us buy the best cold rolled strip stock procurable to your specifications properly boxed, papered and inspected which will cost about 6¼ cents per pound.

Instead of rushing through the press shop let us handle the operations a little more carefully and spend more time on the dies to keep out die marks, slugs, handling scratches, etc., and pay 8/10 cents per piece instead of 6/10 cents.

By doing these two things you entirely eliminate the polishing and reduce the cost of buffing from .015 to .01, to say nothing of having to only give .00075″ of nickel thickness since the extra .00025″ was only lost in trying to cover up marks left by the polisher so that we now have:—

Material	.0625
Polishing	None
Press Operations	.0080
Buffing	.0100
TOTAL	.0805

not including the saving on nickel as metal and its plating time. Also, for simple illustration, all overhead has been omitted which when figured would show an appreciably higher saving.

This is an actual CONSERVATIVE case and not a New Deal Theory, so if you are convinced of the possibilities suppose you continue to the actual specifications which are six in number.

I—Finish

This should be specified as No. 3 cold rolled strip steel of proper gauge, width and in multiples of the length required to make one piece. The No. 3 means to the mill a finish free from handling marks, scratches, rolled shear edges, dents, dirt and anything which would require polishing to remove a blemish of any kind, and most important of all, a certain degree of brightness given by the last cold pass which is better for plating than anything short of buffing with stainless steel compound. The multiples of the length of one piece, although an extra, will more than pay for itself in scrap savings and obviation of the necessity for rehandling to shear.

II—Oiling

This specifies the use of an oil or grease preferably of lanolin base or any other 100% saponifiable composition which will not dry out or shrink during storage. If the proper type is used, no further lubrication will be required for the usual blanking, forming, punching and bending press operations; another small saving.

III—Papering

Each sheet must be separated by a special sulphate type paper free from chemicals tending to attack the steel or solid impurities embedded therein which might mar or scratch.

This paper is retained throughout blanking, punching, bending and some drawing operations in the press shop, and more than pays for itself in the handling scratches and die marks eliminated by its use.

It must not be so porous as to

*From The Quaker City Reminder.

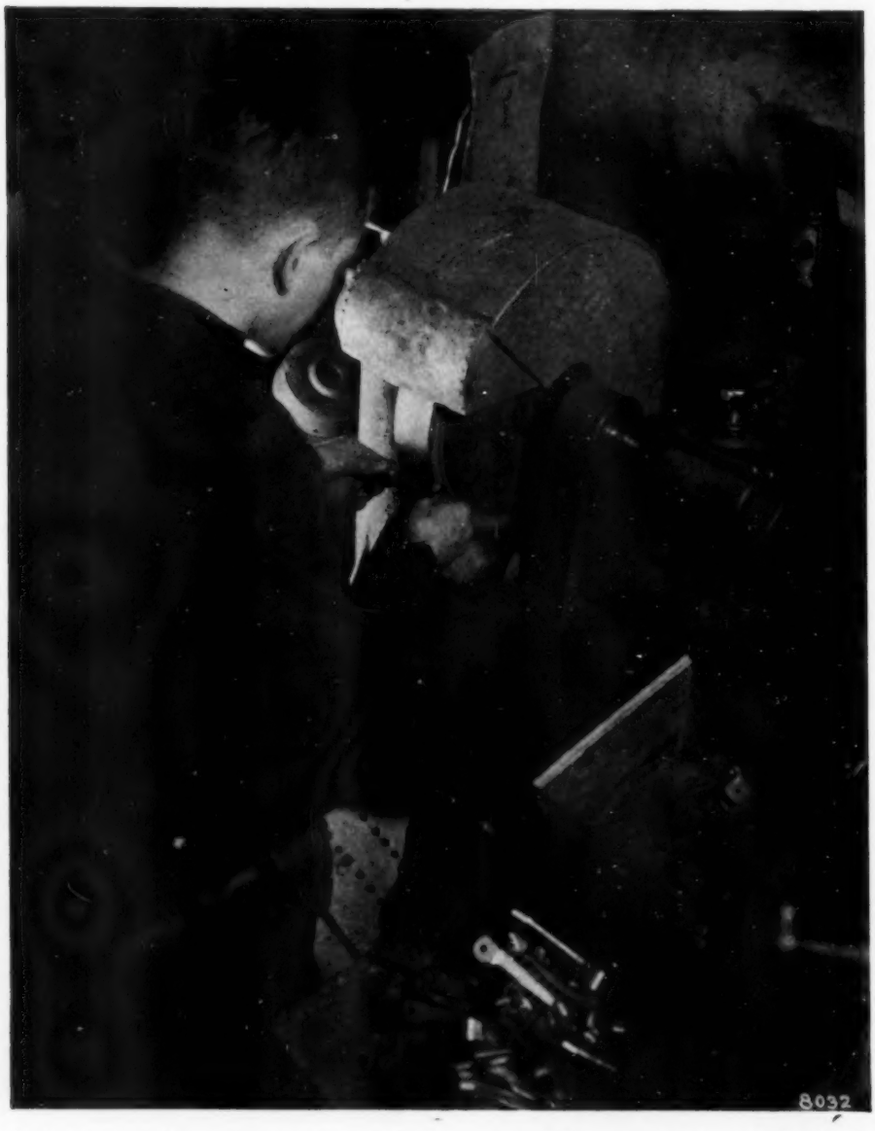
absorb all the oil on the surface of the sheet, leaving the steel to rust, but it must be sufficiently porous on its surface to adhere intimately to the oily stock surface and must be flat and smooth on the sheet to avoid wrinkling which would leave a mark on the stock under pressure.

The paper must cover the entire strip neither overhanging sides or ends nor being narrower than the strip itself.

IV—Boxing

The strips must be boxed in convenient handling weights not to exceed say 500 lbs. and so held therein that no detrimental motion can occur in handling or shipment. The boxes must be bound and nailed securely for the same reasons and be of sufficient thickness of wood to stand all reasonable handling without breakage. The gauge, width and length of stock and the net and tare weights must be plainly stenciled on top along with a notation saying, "best side up," which packing must be satisfactorily seen to by the rolling mill shipping inspector. Also, the net weight must be plainly stamped on one end of the box so that when piled the total weight may be computed without moving all boxes by reading the ends.

In use, the top of the box must always be opened and the stock kept with the best side up with its paper thereon throughout the press operations in order to keep the best side for the finish side.



Polishing small parts; note dust collecting system (Courtesy Lockwood Hardware Mfg. Co.)

V—Temper

This is best determined by agreement with the mill after a sample piece or a drawing have been submitted to them, but from the writer's experience a "B" Rockwell of 45 to 55 will take care of all ordinary press shop operations satisfactorily and the low side is preferable since if the stock is to be stored for any length of time it is subject to an age hardening process which may go as high as five points. In general the closer the hardness is held to 48, the better the bending and medium drawing qualities will be provided the mill has selected the properly cropped billets of the correct carbon and other constituent content.

VI—Grain Size

This subject is not so well known or understood either by the platers or the mills in its relation to finish, but in general the finer the grain size for any given hardness the better looking bends and draws will be in the finished product. There are so many arbitrary number and size nomenclatures used by various mills that any specification here would be misleading, and again the best procedure in this case, as in V, is to have the mill guarantee to deliver a grain size compatible with their hardness which will make the bends and draws required by your sample or drawing free from egg shell, orange peel or breaks of any kind and if time permits they should submit samples for trial on your dies before rolling the whole shipment, at which time you may make or have made your own microscopic grain size count and see that future shipments adhere to the original specifications therefor.

No amount of good steel can be profitably used without the correct methods to process it but the scope of this paper will not permit investigation along these lines.

It would be improper to close his writing without giving full credit to *George B. Hogaboom* for his original arousing of enthusiasm in the writer toward solving some of the reasons for steel failure, some six or seven years ago and also to *George B. Whitehead*, the immediate superior whose patience and invaluable suggestions have done much to secure the rolling mill co-operation.

A Modern Plant Needs Modern Housecleaning

By C. A. SNYDER

Engineer Dustube Division of The American Foundry Equipment Company, Mishawaka, Indiana

THE metal polishing and finishing plant—and, as is so often the case, the non-ferrous foundry that is a division of the same company—have come in for their share of good housekeeping in recent years.

Greater safety and cleanliness being the ultimate aim, dust suppression has rightly received broad attention. Hooding and ventilating of plating and rinse tanks, grinding, polishing and tumbling operations has been a big step. Proper ventilating of founding molding operations, sand conditioning equipment, core benches and shake-out operations are quickly following with the result that workers' efficiency is increasing and product improvement has naturally followed.

In most cases, all dust creating operations within a given plant can be tied into a single dust collector unit, effecting savings in space, equipment, maintenance and depreciation.

The general application for dust suppressing equipment logically divides itself into three classifications:

(1) The suppression of dust and fumes for the protection of workers' health and safety; that is, the elimination of dusts and fumes harmful to the worker, as well as those of an explosive nature dangerous to the workers' safety.

(2) The elimination of dust and fumes which tend to be a community nuisance and act as a blight on vegetation in the area surrounding the plant, and which are harmful as well to the bearings, motor windings, and operation of equipment within the plant; dust which causes light absorbtion on windows and walls, lessening workers' efficiency; which dirties machines, packaged products, and items of merchandise prior to shipping.

(3) The collection of dusts and fumes of commercial value which can be salvaged and returned to the process equipment, such as food products, sugars, starch, chemicals, etc.

Most suppression problems fall into Classification (1): that of eliminating the hazard for industrial workers.

To properly control industrial dust is simply a matter of intelligent engineering and design and following out the logical steps in equipment selection, application and operation.

The first step for the industrial plant manager is the selection of the best method of dust suppression which usually means the adoption of one of the several types of cloth screen, tube or bag type dust collectors. With such an installation, the air exhausted by the dust arrester has a lower dust count than so-called "clean-air" in the parks and recreation places in most large metropolitan cities.

The second logical step is the determination of the placement, size and type of hoods and nozzles required for ventilating and cleaning up working zones, machines, rooms and buildings where dust is a derogatory element.

The third step is the selection of the proper size of unit for the work intended, and the selection of the logical location for the dust arrester installation. As is most frequently the case, they are located on the building exterior, or roof, so as not to occupy valuable floor space needed for production equipment.

This is usual procedure today for modern dust arresting equipment requires no operating labor or attention other than occasional inspection and emptying of the collection hoppers; rapping down of the tubes being by remote control through an electrical pushbutton.

Cloth was the first practical dust suppressing medium employed and while many other media have been used for this purpose, cloth still is most widely used for dust suppressing purposes. The more modern adaptation is in the form of cylindrical tubes suspended at the top of the dust arrester housing and discharging the precipitated particles of dust into a collecting hopper at the bottom of the collector unit.

Modifications of cloth tube type collectors are used, not only on dry dust collection, but hot and moisture-laden air, fumes, and extremely heavy loads where a cyclone unit is placed ahead of the collector, or large precipitation chambers, air or water-cooled, are employed ahead of the dust collector unit.

Those desiring to clean up a contaminated air condition should make a survey of all dust creating operations, which should include the making of dust counts at all places in the plant where dust or fume creating operations exist. Assistance in this work can frequently be obtained from bureaus of industrial hygiene which have now been established in almost all of the industrial States throughout the country.

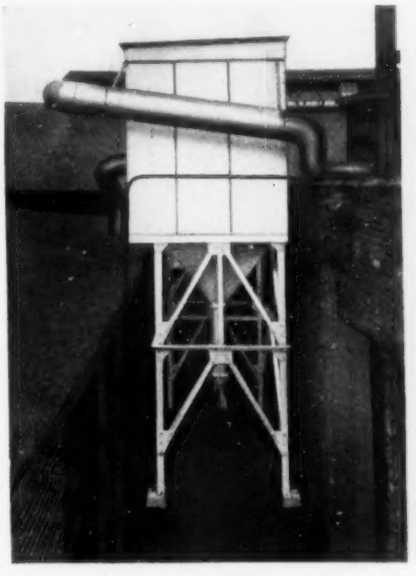


Fig. 1. A typical dust collector installation on the roof of a metal finishing plant

In the adoption of control measures, correct operating procedures are often as effective and economical as the mechanical equipment employed, and it is to be remembered that the development of such procedures and the education of plant personnel can only come through constant education from the management down through the supervisory production personnel.

Employees should be thoroughly instructed as to the use and necessity of proper operation of dust control equipment. Shop superintendents and foremen are logically the key men and should be thoroughly instructed by the management of the necessity for keeping dust exposure down to a minimum.

Employees' responsibility includes both the use of dust control or protective equipment provided by the management, as well as the compliance with all safe practices suggested by the management for the prevention of dust hazards. The worker should understand the breathing of dusts in amounts sufficient to produce trouble produces no immediate effect, there being no apparent irritation or soreness of the mucuous membranes, and accordingly when symptoms are noticeable, it may be too late for remedy.

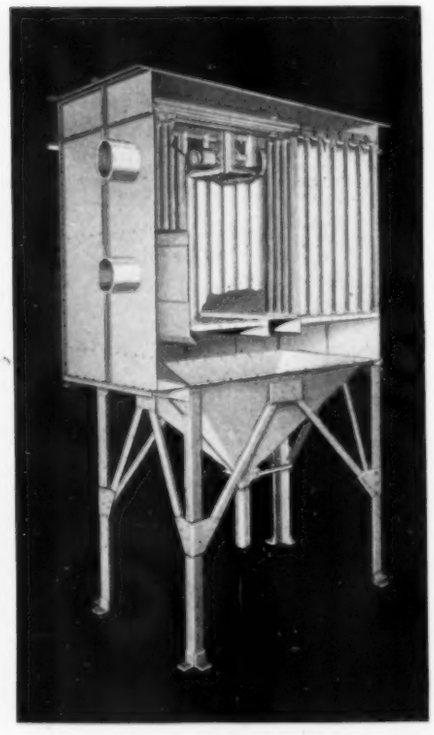


Fig. 2. Cutaway illustration showing shaker device, cylindrical tubes for trapping dust, housing, hopper and dust removal valve

Holes in Valve Castings

Q.—We are sending you, under separate cover, a section which we have cut from one of our valve bodies. You will note that this piece has several holes in it. We would appreciate it very much if you would advise us, if possible, what is causing this condition.

We are using an oil sand core, and the mixture of the metal is 85-5-5-5, poured at an approximate temperature of 2100°F. We are using No. 2 Albany sand, and have a rocking type, electric furnace.

A.—We received sample defective casting cut out of valve body and on examination of same we are of the opinion that the cause of this defect is gas.

Now, how is this gas formed? It may be that the core is not soft enough or is not vented or not sufficiently opened. It may be rammed too hard. As the defect is inside it must be caused by the core. We suggest that you open up your core sand mixture and also see that the core is vented.

However, another possible cause can be that you are using hot molding sand; that is, after facing the mold with cold sand, warm sand is supplied to the balance of the molding box, which would have a tendency to cause the mold to sweat and cause the core to be damp. The metal coming in contact with the damp core generates gas.

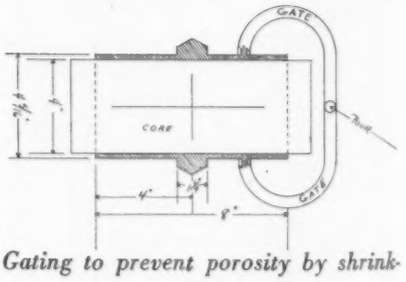
—W. J. Reardon.

Internal Shrinkage of Castings

Q.—I would like to ask your valuable advice about a foundry trouble that I encountered recently. The said trouble was in some brass castings that we made. The castings were termed 4" adapters. They were 8" long, 4 5/16" OD with a 1¼ hexagon band around the centre. It has a 4" core and is gated just under the hex band. The casting is machined half way inside and threaded on the exterior. When finished they look perfect, but when tested they show a decided leak around the threaded area. There were no flaws noticeable to the eye, but when we broke a casting we found that the metal was in two distinct layers nearly the full length with a dirty green discoloration between layers. The castings were poured at a temperature of 2150° Fahr. and the composition of the castings was 83 copper, 2 tin, 5 lead, 10 zinc; fired in a coke pit furnace and melted in a graphite crucible.

A.—We would say your trouble is caused by internal shrinkage and in that case it is caused by the metal chilling the core and mould, and not sufficient metal in the thickness of the castings to keep the metal liquid until it sets in its natural way.

We suggest that you gate on both sides of the casting, pour at 2200 degrees Fahr., and soften up your core,



Gating to prevent porosity by shrinkage

and we feel this will overcome your difficulty.

— W. J. Reardon.

Aluminum Funnels for "Mauretania"

The London *Times* reports: Experiments and prolonged tests have led to the decision to construct aluminum alloy funnels for the Cunard White Star liner *Mauretania*, of 30,000 tons, now under construction by Cammell Laird and Company, at Birkenhead. The vessel will be the first of her size in the world to have aluminum funnels. The principal reason for the use of aluminum alloy is to save weight, but its resistance to corrosion has also been taken into account.

Automatic Equipment for Plating Electric Clock Parts

THE Warren Telechron Company, Ashland, Mass. has recently installed in their plating department a return type full automatic washing and drying conveyors and a semi-automatic plating conveyor, this equipment making a flexible unit in the finishing of parts for their electric clocks. The equipment was furnished by the Hanson-Van Winkle-Munning Co., Matawan, N. J.

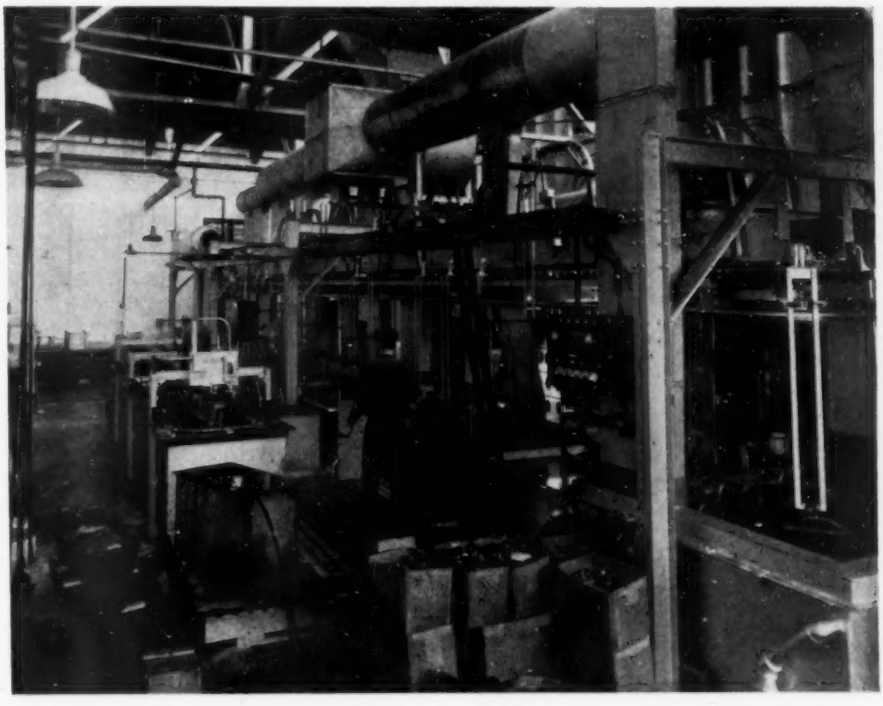
The full automatic washing and drying conveyor is so arranged that it washes and dries an assortment of various parts at the same time. It is loaded at one end by hanging racks of work on the carriers of the conveyor. The racks are of various designs to handle different kinds of parts but all are constructed so as to be hung interchangeably on any of the conveyor carriers. The conveyor carries the racks of parts through the various washing solutions and returns them through a dryer adjacent to the loading station after which the racks of finished parts are removed from the conveyor carriers and replaced with racks of work to be washed. This forms a continuous cycle.

The semi-automatic plating conveyor is located parallel to the washing conveyor with its loading end near that point in the washing cycle at which the washed rack is ready for plating. Where plating is desired, an operator removes the rack of work from the washing conveyor and hangs it on a carrier of the plating conveyor which carries the work around the plating tank and returns it to the loading position. Here the rack of plated work is replaced on a carrier of the washing conveyor which carries it through the remaining cycle of operations, through the dryer and back to that station on the washing conveyor where the racks are unloaded.

The speeds of the washing and the plating conveyors are so synchronized that all the carriers of both conveyors are continuously loaded to capacity. The racks are so designed that they can be hung on any carrier of both the washing or plating conveyor. In this way parts can be processed through the finishing department as they are required for clock production, processing various types of parts at the same time. This insures a uniform quality of highest grade finishing and reduces the cost of this quality finish to a minimum.

By doing the washing and plating on separate conveyors, it is possible to wash work which is not to be plated, such as work to be lacquered. This feature also permits changes or additions to the kind of plating performed and still allow the washing of all work on the washing conveyor.

The Warren Telechron Company is very pleased with the results obtained with this equipment, not only from the standpoint of increased production, but also for the uniformly high quality of finish for which their product is so well known.



Return type full automatic washing and drying conveyors and semi-automatic plating conveyor installation at the Warren Telechron Co., Ashland, Mass.

Nickel Strip

Q.—I would like to know if you can strip nickel from brass without the necessary electrolytic sulphuric solution. That is, can you strip nickel from brass in a plain acid solution. What is that solution?

A.—A nitric acid bright dip can be used for stripping nickel from brass, if the nickel plate is not too heavy. Use equal parts by volume of water, sulphuric, and nitric acids. To each 40 gallons of dip add 1 fluid oz. of hydrochloric acid. This dip will also attack the brass so that if the nickel is very heavy, or if the coating is not uniform and dissolved off evenly, the brass will be pitted before all the nickel is removed. Use cool.

Another strip can be made using a 5% solution of hydrochloric acid, making the work anode, 6 volts. Place an ammeter in the circuit. As stripping proceeds the ammeter needle will fall. Remove work just as the needle comes to rest, not waiting for the zero point to be reached.

—G. B. HOGABOOM, JR.

Shop Problems CASTING • METALLURGICAL FABRICATION • ASSEMBLING • • PLATING • FINISHING

Questions from readers relating to shop practice and answers by our associate editors

Black on Aluminum

Q.—Please give me a formula for black on aluminum.

A.—A black on aluminum is produced by a plate in a solution containing:

Double nickel salts	8 ozs./gal.
Zinc sulfate	1 oz. /gal.
Sodium thiocyanate	2 ozs./gal.

pH 6.8 1 volt, ½ amps./sq. ft., room temp.

—G. B. H., Jr., Problem 5,640.

Building Up Chromium

Q.—Is it possible to build up steel shafts from .004" up to .015" in diameter with chromium and then grind the surface down to the size required? We would like to know if there is any special process the steel must go through before being plated. We have tried putting these steel shafts through regular plating process and have been able to build them up to .004 and .005, but when they are ground down to size the chromium starts to flake off. Please advise if this can be eliminated.

A.—It is possible to build up such deposits but the solution must be controlled. It appears that your solution is unbalanced and the deposit very brittle.

In order to produce an adherent deposit the steel should be treated with reverse current in a separate chromium solution containing no sulfate and then transferred directly to the plating solution without rinsing.

Details as to the procedures used today in building up heavy deposits may be found in an article by Nathaniel Hall in the Monthly Review of the American Electro-Platers' Society for December 1937.

—G. B. H., Jr., Problem 5,641.

Black Chromium

Q.—We are etching stainless steel and would like to cover the etched surfaces with a black deposit. We understand that a black chrome deposit will do the trick. Please advise how this is done and if there is any other substance besides black chromium that can be deposited easier that would answer our purpose, just so it cannot be removed with gasoline, benzine, etc.

We operate an electrotype foundry in connection with our photo-engraving plant and it occurred to us that we might be able to use some of our present equipment to do this work.

A.—Black chromium is produced from a bath containing 33 oz./gal. of chromic acid and 0.3 oz./gal. of glacial acetic acid. The temperature must be kept below 15 deg. C. and the current density above 1,000-1,500 amps./sq. ft. This requires from 11 to 14 volts and 1 minute plate is sufficient. It is very difficult to keep the solution sufficiently cool unless refrigerating coils are used.

There are lacquers on the market which will adhere to chromium and stainless steel surfaces and we would

Use this Blank for Solution Analysis Information

Fill in all items if possible.

Date .....

Name ..... Class of work being plated: .....
Address ..... City ..... State ..... Volume used: .....
Employed by: ..... Solution depth: .....
Kind of solution: ..... Cathode surface, sq. ft.: .....
Tank length: ..... width: ..... Kind of anodes: .....
Anode surface, sq. ft.: ..... Distance from cathode ..... Original formula of solution: .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

suggest that you get in touch with manufacturers of lacquers such as advertise in METAL INDUSTRY.

—G. B. H., Jr., Problem 5,642.

Dull Black on Surgical Instruments

Q.—We have had several requests for a dull black finish on surgical instruments.

As these instruments have to be sterilized in boiling water, an oxidized finish that requires lacquering would be useless.

If you know of any black finish, plated or otherwise, which would stand up under the abuse a surgical instrument has to take, we would greatly appreciate hearing about it.

A.—There is no black finish that can be applied to steel that would be entirely suitable for surgical instruments. Dip, or "oxidize" blacks such as Parkerizing, or Jetal, will require a lacquer or oil to protect against corrosion.

One possible procedure is to first give the steel a heavy nickel plate (.001" for good service) and then a black nickel plate, using a solution such as:

Single nickel salts	10 ozs.
Double nickel salts	6 ozs.
Zinc sulphate	5 ozs.
Sodium sulphocyanate	2 ozs.
Water to make	1 gal.
pH	6.6

Use carbon anodes, and not over 1 volt pressure.

—G. B. H., Jr., Problem 5,643.

Flash Gold

Q.—Would you kindly send me the best possible solution formula for flash gold plating with stainless steel or carbon anodes.

I started out with a gold cyanide solution and gold anodes, but found that with a lot of work done a solution has to be discarded once in a while and a new one made up, and on recovering gold I can get as far as making gold chloride and have no success in making gold cyanide. So now I favor a gold chloride made into fulminating gold solution. It is easy to make and I can recover from old baths successfully. Then this bath works O. K. with steel anodes which also simplifies things considerable.

For our work which is cheap jewelry novelties, I would like a formula that will give a fine netted gilding job, a little better than the cheapest flash coloring, which will come out of the bath bright.

I noticed when I made up the bath that a sediment formed soon after, also noticed in Dr. Langbein's book his opposition to steel anodes, although he worked with some kind of blued steel. Do you believe that steel anodes will be alright for my purpose?

A.—For information on gold plating solutions we refer you to page 18 and following in the 1937 edition of the Platers' Guidebook, published by the METAL INDUSTRY. For flash plating you can use a salt water gold solution made according to the following formula: (page 20)

Gold chloride	6	dwt.
Potassium ferrocyanide	2	ozs.
	Use at 160 deg. F.	
Disodium phosphate	1	oz.
Sodium carbonate	½	oz.
Sodium thiosulphate (hypo)	.02	oz.
Water to make	1	gal.

The solution is boiled for 30 min. and then filtered. The salt water gold apparatus can be made as described or can be purchased from manufacturers such as advertise in METAL INDUSTRY.

For plating with current from the generator use:

Sodium gold cyanide	½ oz.
Sodium cyanide	½-1 oz.
Disodium phosphate	2 ozs.
Water to make	1 gal.

Temperature 140-160 deg. F. Voltage 2½ volts.

In regards to anodes, straight steel anodes will gradually precipitate metallic gold from the solution. Also, they will be attacked if chloride is present. Stainless steel or nichrome anodes of sufficient cross section to carry the current to overcome the resistance of these materials, can be used with success.

The above formula calls for sodium cyanide. Potassium cyanide can be used and is sometimes considered to give slightly better results. In using potassium cyanide, figure to use one-third more by weight than what is called for in sodium cyanide in order to have the same cyanide equivalent.

The use of sodium gold cyanide is given as it is an easily available source of gold for a cyanide solution. Such a solution, operated with a portion of the anode surface as soluble gold anodes in quantity sufficient to make up for metal lost from the solution can be operated for a long period before a new solution is required.

—G. B. H., Jr., Problem 5,644.

Nickel Electrotype

Q.—Nickel electrotype on copper. Using solution containing 3½ oz. single nickel salts; 1½ oz. double nickel salts; pH 5.8-6.1; temp. 90 deg. F.; 95-97 cast nickel anodes. The shell has dents or craters.

A.—Your solution contains appreciable amounts of iron due to the low pH and low purity anodes. The nickel that is deposited is of a different nature than the copper shell and the two metals have different expansion coefficients besides the fact that the nickel is more brittle and hard. Due to this difference, when pouring the backing metal, the heat causes the shell to distort.

The remedy is to uese a softer nickel and purify the solution. Would suggest a solution as in the Platers' Guidebook and high purity anodes.

—G. B. H., Jr., Problem 5,645.

Rubber Covered Racks for Silver Solutions

Q.—Would like information concerning rubber covered racks to be used in silver plating solution. Would there be any chemical action such as sulphur to discolor the silver deposit working out from the rubber?

A.—Some rubber may be suitable if it does not contain free sulfur. It is suggested that you write to advertisers in METAL INDUSTRY and try some samples first. It is best to specify the type of solutions to be used with the racks.

It may be best for your application to use steel racks and recover the deposited silver by stripping with reverse current in a solution containing:

Sodium cyanide	12 ozs./gal.
Caustic soda	4 ozs./gal.

using a steel, stainless steel or sheet silver cathode.

—G. B. H., Jr., Problem 5,646.

Metal Casting Digest

Short abstracts of articles of interest to practical non-ferrous foundrymen and metallurgists

By H. M. ST. JOHN
Associate Editor

Remelting Aluminum in the Foundry. H. Rohrig. Metal Ind. (London), July 2nd, 1937, page 5.

More than in any other field of remelting, the remelting of aluminum alloys is a job which only the really experienced is capable of performing satisfactorily, any mistakes which may be made have repercussions greater than in other fields. To reduce oxidation losses, aluminum and its alloys should not be heated above the range 730° C to 750°C. Such impurities as sodium, calcium and magnesium increase the loss. Turnings, wires, etc. should not be melted direct but should be immersed in a molten bath. A slightly oxidizing atmosphere must be used to avoid gassing. Fluxes, capable of dissolving oxide films, are used to coalesce oxidized particles. Cryolite, mixed with sodium and potassium chlorides, makes an excellent flux. Oil and grease should be removed from scrap before melting. The addition of some pure electrolytic metal is helpful in reducing losses. The gas content of the metal is higher in summer than in winter due to higher moisture content of the air used in combustion. For this reason the electric furnace, using no air, has a considerable advantage, in addition to the better temperature regulation which it makes possible. Chlorine gas, metal chlorides and organic compounds containing chlorine are successfully used (in Germany) for degasifying molten aluminum. It is commonly better to prevent absorption of the gas in the first place. Molten salt coverings are advantageous.

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Nonferrous Melting Requires Excellent Furnace Operation. N. K. B. Patch. Foundry, July, 1937, page 25.

Discusses details of operation and maintenance for pit-type crucible furnaces, barrel-type fuel-fired furnaces, and indirect-arc electric rocking furnaces.

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Prevention of Silicosis Through Engineering Control. Anon. Foundry, July, 1937, p. 29.

An extract of the report by the Engineering Committee at the Second National Silicosis conference. Respirators are of three types: (1) Supplied-air, (2) supplied-oxygen, and (3) air-purifying. Their use and care is discussed. Methods for determining the concentration and character of industrial dusts are indicated. The report lists the responsibilities of management under five heads: (1) Compliance with statutory provisions, which are often of a minimum character, (2) Determination of the severity of the dust exposure, for which assistance can be obtained from state bureaus of industrial hygiene, (3) Acquisition of information on best engineering practice, and adoption of the necessary devices and procedures, (4) Instruction of employees, for which the program of the American Foundrymen's Association is cited as a model, (5) Regular use and maintenance of dust-control machinery and protective equipment.

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Fundamental Considerations in Non-Ferrous Sand Control. G. K. Eggleston. Trans. Amer. Foundrymen's Assoc., July-Aug., 1937, page 110.

The geological formation of moulding sands is described, with particular reference to clay content and grain distribution. The relationship between grain size and permeability is illustrated. There are six or more different species of clay and the percentage of clay in the sand is often less important than the kind of clay. Simple methods for control are described. The advantages are: Less scrap, a better finish on the castings, lower sand cost, the practical elimination of time spent in the investigation of troubles due to sand and moulding practice.

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Sand Control at the Northern Indiana Brass Company. A. C. Arbogast. Trans. Amer. Foundrymen's Assoc., July-Aug., 1937, page 122.

All heaps are tested twice each week for moisture, permeability and green compression, using the Dietert system. Casting losses have been greatly reduced.

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Portland Cement as a Binder for Foundry Molding Sand. Carl A. Menzel. Trans. Amer. Foundrymen's Assoc., July-Aug., 1937, page 200.

This paper provides information of general interest to foundrymen regarding the use of portland cement as a binder in foundry molding sand. It presents results obtained in laboratory studies of the relative influence of various factors affecting the strength and permeability of cement foundry-sand mixtures. Among the factors studied were type of cement and cement content, moisture content, type of sand, extent of ramming, temperature and age of mix, etc. The results obtained indicate the general feasibility of using portland cement as a binder in molding sand and provide a basis for suggestions and recommendations for such use.

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The Importance of X-Ray Examination of Macrostructures and Crystal Structure for the Foundryman. E. Schiebold. Aluminum and the Non-Ferrous Review, May, 1937, page 251.

The use of the x-ray technique in the production of a casting facilitates the selection of the appropriate materials and the examination of their tendency to shrinkage and gas absorption. It makes possible the early detection of casting defects without destruction of the part and indicates how casting conditions may be changed to eliminate defects. The paper gives examples in the field of light-metal castings.

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Economics of Secondary Aluminium. Part I Robert J. Anderson. Aluminium and the Non-Ferrous Review, July, 1937, page 305.

As a rule, little or no refining is done in the remelting of aluminum scrap and wastes. It is a melting rather than a smelting operation. Scrap of known composition is selected or blended to produce the desired pig metal. When necessary, impurities may be diluted by adding metal of high purity. Infrequently, special fluxing methods may be used to reduce certain impurities, or, at the cost of additional loss of aluminum by oxidation, magnesium and zinc can be burned out by the use of an abnormally high temperature. In the United States, for the period 1913-1935, 39 lbs. of secondary metal have been recovered for every 100 lbs. of primary metal produced.

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Notes on the Structure and Characteristics of Aluminum Alloys. Part I. H. C. Hall. Aluminium and Non-Ferrous Review, July, 1937, page 321.

A review.

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A Small Oil-Fired Rotary Furnace. E. W. Wynn. Foundry Trade Jour., Vol. 56, page 426 (1937); Chemical Abstracts, July 20, 1937, col. 4933.

Furnace construction and operating details are described of a small oil-fired furnace as well as some of the products manufactured in it.

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Effect of Gases on Formation of Pores in Casting of Copper Alloys. E. Raub. Mitt. Forsch.—Inst. Probieramts Edelmetalle staatl. hohern Fachschule schwab. Gmund., Vol. 11, page 1, (1937); Chemical Abstracts, July 20, 1937, col. 4934.

Three forms of combination of a gas with a metal are considered: (1) pores or bubbles of gas, (2) solid solution of the gas in the metal and (3) chemical compounds of the gas and metal. Case 1 is a mechanical inclusion while 2 and 3 constitute a firmer combination and cannot always be definitely distinguished. Case 1 acts as a reduction of the section. Hydrogen is dissolved in liquid copper to a certain amount but released again upon solidification. Sulphur dioxide is absorbed by molten copper, forming cuprous oxide and sulfide. The behavior of copper in the melt and the reactions in the mold, in particular with water vapor, are discussed and the effects of additions of zinc, aluminum, tin, nickel with regard to density of casting and absorption of gases are described with diagrams of the effect of hydrogen, carbon dioxide, sulphur dioxide and water on sp. gr. and evaporation of the more volatile additions. Copper-nickel alloys absorb the gases named to a very great extent and release them partly on solidification, often producing porous castings.

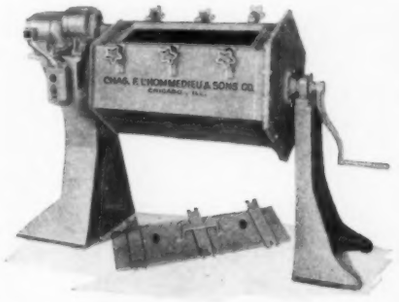
Modern Production Equipment

New processes, machinery and supplies for metal products manufacturing and metal finishing

Tumbling and Burnishing Barrels

A new line of tumbling and burnishing barrels called the Reliance has been designed by Chas. F. L'Hommedieu & Sons Co., 4521 Ogden Ave., Chicago, Ill. The barrels are used for tumbling, steel ball burnishing, abrasive tumbling, sawdust tumbling and leather meal tumbling. They can be used for sand tumbling articles to remove burrs or with leather meal or chips to obtain a lustre before or after plating. The cylinder is made of heavy steel plates with one end removable to insert wood or other types of linings. Door construction is simple and rigid and vents are provided on the door to release gas pressure. The crank on the end is provided so that the operator may turn the barrel to any position desired and dump the work slowly to prevent splashing of liquids.

Ball bearings are used throughout. Starting box has push button stop and start with overload thermo release. Three sizes are provided—48″ long, 20″ diameter; 38″ long 20″ diameter; 24″ long 20″ diameter.



Reliance Type G tumbling and burnishing barrel

Automatic Plating of Cylinders for Textiles and Paper

The demand has long existed for an automatic plating machine, designed specifically for plating cylinders used in the paper and textile industries.

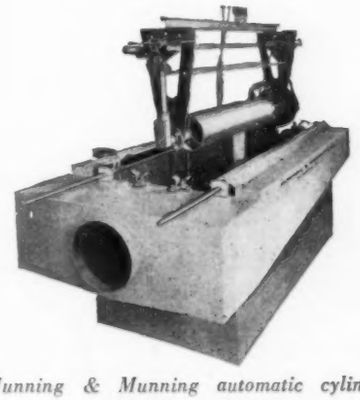
Such a machine has just been developed and placed on the market by Munning & Munning Inc., manufacturers of electroplating equipment and supplies, 202-208 Emmett Street, Newark, N. J.

The accompanying illustration of this new machine clearly depicts the hanger mechanism, the solution heating coils and the ventilating casing, because this particular machine was designed for chromium plating. For copper, nickel or other types of plating some of these features are not required, and the apparatus can be modified to meet the precise nature of the conditions to be encountered.

Rolls as large as 30″ or more in diameter and of any practical length can be plated with a minimum of handling, and with assurance that every part of the roll will be subjected to the same plating condition. The deposit produced is uniform because the roll is totally immersed in the solution during the plating operation.

When the hanger mechanism carrying the roll is lowered into the plating solution electrical contact is instantaneously made, and the roll is automatically revolved at the correct speed during the plating operation.

The motorized drive which engages the lifting and transfer mechanism is placed on the farther end of the machine directly opposite the exhaust duct.



Munning & Munning automatic cylinder plating machine

All electrical conductors are ample in capacity for current demands. The entire machine is rigidly constructed, designed for dependability in operation and simple enough so that a single operator can manage it.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Close Corner Angle Head; full speed angle head equipped with miter gears and ball thrust bearings; adaptable to flexible shafts. Will handle rotary files, burs, drills, mounted points, etc. Stow Manufacturing Co., Inc., Binghamton, N. Y.

"Non-Pickable" Lock; pick-proof cylinder to prevent burglaries; can be installed on locks at present in use. Segal Lock & Hardware Co. Inc., 261 Broadway, N. Y.

Four Point Toggle Press; 180″ between uprights; 8″ thick bolster plate, and 100″ front to back by 180″ right to left. Bliss No. 4CT-12-180. E. W. Bliss Co., Toledo, Ohio.

Oxy-Acetylene Hose. "Duoweld." One strand red, the other green to distinguish between acetylene and oxygen lines. Mechanical Rubber Goods Div., B. F. Goodrich Co., Akron, Ohio.

Centrifugal Pumps. New line of single stage, side suction, ball bearing pumps; eighteen sizes. Goulds Pumps, Inc., Seneca Falls, N. Y.

Portable Shearing Equipment. "Lectro-Shear"; 18 gauge and 16 gauge sizes. Black & Decker Mfg. Co., Towson, Md.

Power Drills. Utility power drill line; 5/8″, 3/4″ and 7/8″ drills. Black & Decker Mfg. Co., Towson, Md.

Geared Beading Machine; for the heavier beading operations encountered in blow pipe, ventilator, can manufacturing, etc. Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.

Portable Drum Crane and Accessories; to eliminate hand-lifting and moving of 55 gallon drums. Morse Mfg. Co. Inc., Syracuse, N. Y.

Sodium Lamps for Industrial Plants; for night work on roads, driveways, parking lots, loading and receiving platforms, etc. General Electric Co., Schenectady, N. Y.

Jointed Stainless Steel Rule; for engineers, draftsmen, shop men and others. George Scherr Co., 128 Lafayette St., New York.

Precision Instruments; toolmaker's microscope with projector; camshaft tester; optical circular table; gear testing machine. Carl Zeiss, Inc., 485 Fifth Ave., N. Y. City.

Reset Free-Vane Controllers; air operated; for temperature, pressure, vacuum, flow and liquid level. The Bristol Co., Waterbury, Conn.

High Production Press. No. 6150-B. 15 H.P.; 30, 45 and 60 strokes per minute. E. W. Bliss Co., 1420 Hastings St., Toledo, Ohio.

Heavy Duty Drill Grinders; 1 and 2 H.P. capacity. Hisey-Wolf Machine Co., Cincinnati, Ohio.

Contour Machine. New low priced Model V-16. Two ranges of variable speed. Automatic butt welder built in and four-way table tilt. Continental Machine Specialties, Inc., 1301 Washington Ave., S., Minneapolis, Minn.

New Spraying Equipment

The Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill. announces a number of additions to their line of spraying equipment as described below.

HELMET TYPE RESPIRATOR

A new helmet type resporator especially adapted to overhead and outdoor paint spray work and protects head, neck and shoulders; light in weight, easy to wear. Muslin hood is attached to cap and fits snugly over the shoulders. Has large pyralin window easy to clean.

Binks No. 686 paint spray mask

Cap has air connection at back. By taking off a "tee" at the air connection to the Spray Gun and by using an air adjusting valve, a small amount of air can be brought into the helmet by means of a small length of hose. Air thus brought into the mask pushes downward and out, thereby keeping outsides fumes from operator. Known as Binks 686 Paint Spray Mask.

BINKS EXTENSION SPRAY GUNS

Using a standard production spray gun, the job of brightening up your plant is made easier by means of various handy extension arms.

The two brass tubes of this extension fit into the air and material connections

Binks extension arm for painting

of the standard Binks Thor 7 or Thor 2 Spray Gun. As easily attached as hose. A man can stand on the floor and paint the ceiling and upper walls with a 6, 8, or 10 foot extension arm.

SPRAYING OUTFITS OFFERED IN HAND CART MOUNTING

A variety of different mounting styles to meet the needs of users of portable paint spraying compressors; six different mount-

Binks 2-wheel hand cart mounting for spraying outfit

ing styles. One of the most popular of these mounting styles is the 2-wheel hand cart style illustrated It can be furnished with steel wheels or pneumatic tires. Recommended for interior work in factories and public buildings. Well balanced and easily portable. Rubber tires recommended where there is danger of marring finished floors.

TWO-CARTRIDGE TYPE RESPIRATOR

Known as Binks No. 7 Respirator the new twin-cartridge type Respirator is easy

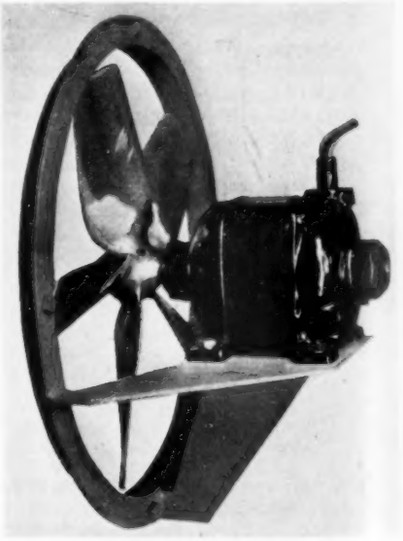
Binks No. 7 respirator

to put on and adjust. Fits face with perfect, fume tight seal. Permits full vision and unhampered working freedom. Its use of two filter cartridges reduces the breathing resistance to less than half of the single cartridge type.

Paint vapors and pigments are said to be removed more thoroughly and the life of each cartridge is increased.

LINE OF VENTILATING FANS

The new line, known as Binks W F D Exhaust Fans are especially recommended where rooms are only indirectly ventilated.



Binks WFD exhaust fan

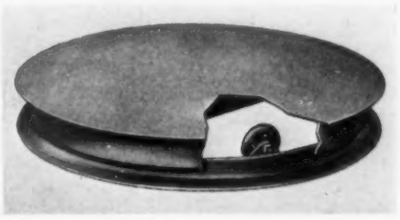
Not recommended where quiet operation is a requisite.

Furnished with guard over five bladed propeller. Can be easily put in place in a window, transom, or other opening by mounting a wood or metal frame around it. Explosion proof motors in various common specifications.

TURNTABLE FOR SPRAY BOOTHS

A new roller type turntable to be used in a spray booth for rotating heavy objects in front of the spray operator.

The turntable can be placed on the floor of a bench type booth, or it can be furnished with legs for use with a floor type booth.

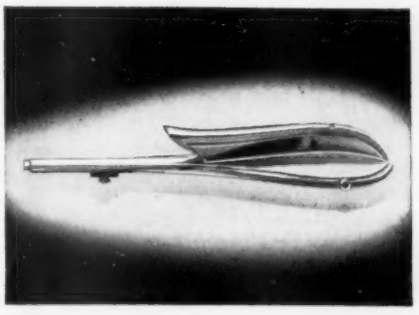


Binks roller type turntable

New Bright Nickel Plating Process

The Udylite Company, 1658 E. Grand Blvd., Detroit, Michigan, estimates that savings of from 25% to 50% and greater can be effected in the finishings of metal parts through the use of the Udylite Process of bright nickel plating. Many advantages are claimed for this bright nickel coating over the former old, dull nickel, some of which are as follows:

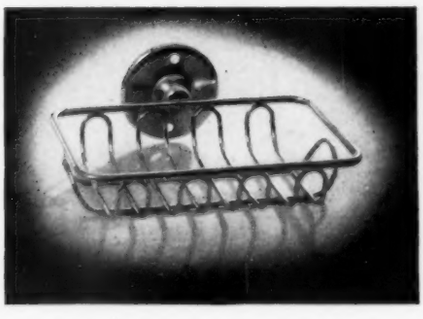
1. Elimination of most, if not all, buffing, tumbling, and coloring operations to give the nickel coating the proper lustre before the final chromium plated finish.
2. Elimination of copper buffing before nickel plating. Udylite bright nickel can be applied directly over smooth copper deposits without buffing.
3. Bright nickel deposits are secured in deep, inaccessible recesses. This means that many die castings in particular, and brass and steel parts of irregular shape may be finished more economically. Complicated parts are expensive to buff.
4. Many inexpensive articles may be given an attractive bright nickel coating with no buffing, polishing, or tumbling of the base metal or nickel coating.
5. No nickel is lost by buffing. Also, cut-through rejects are eliminated. No nickel is removed from high points where wear is most likely to occur.
6. Chromium has better throwing power over bright nickel than over buffed, dull nickel, making for simpler and cheaper racks and less rack maintenance.
7. Parts plated on wire or certain simple racks may be taken directly from the nickel (after washing) to the chromium plating bath without buffing, handling, or re-racking. When this is possible, the racking problems are simplified and less rack investment required.



This part is buffed, copper plated (no copper buffing), bright nickel plated, light nickel wiped, then chromium plated

The nickel coating process by the Udylite Process is smooth and ductile as well as bright. It adheres well and does not flake, chip, or peel. No activation is required prior to chromium plating. It is said to be a stable, easily-controlled bath having excellent throwing power or ability to deposit into recesses. No ingredient decomposes to produce undesirable results. The operating efficiency is high, 98-99 per cent. Highly lustrous nickel deposits are obtained over a wide range of plating conditions. Ease of control and operation is another very important advantage claimed for the Udylite bright nickel plating solutions. Materials necessary for the process obtained over a wide range of plating conditions are furnished at competitive prices and no special royalties or fees are connected with the process. Moreover, Udylite engineers install the process, see that it is operating properly and periodically visit each installation at no expense to the customer.

This saucepan (8 in. dia. x 5 in. deep) is flashed with copper, then bright nickel plated. The solution deposits a bright, even coating.



This inexpensive wire soap dish is copper flashed and bright nickel plated directly on unburnished steel

General Cleaner

A general cleaner made by Magnus Chemical Co., Garwood, N. J., designated as 55-P is recommended for cleaning in a wide variety of conditions and products. It is a mild cleaner designed to clean, deodorize and disinfect. It is recommended for use in wash rooms, gymnasiums, swimming pools, locker rooms, for washing auto, bus and truck bodies, cleaning bus interiors, plant and factory interiors, etc.

One-piece Rubber Diving Suit

An interesting development is reported by Collord, Inc., Detroit, Mich. They recently built especially to order for M. E. Nohl, Milwaukee, Wisc., a diving suit to wear at a depth of 420 feet under water. A pattern was made from which a canvas foundation was cut and carefully sewed. On this foundation Collord applied rubber by their SRL method, until a continuous coating was formed 1/16″ on the inside and ⅛″ on the outside, graduated to ¼″ on the shoulders and neck section—a seamless and continuous rubber unit without a lap, welt or break from top to bottom. This suit withstood without splitting, ripping or leaking, a pressure of 181 pounds per sq. inch.

Rubber coating for industrial purposes can be applied in the same way and with the same properties.

Fibre Meals

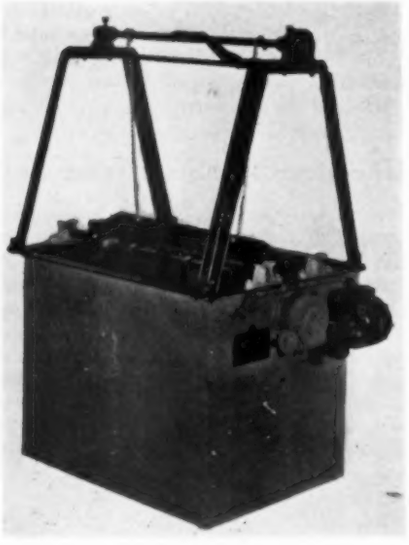
Beaverbright fibre meals are a product of H. Leroy Beaver, Lansdale, Pa., manufacturer of burnishing materials. These meals are recommended to replace the heretofore used sawdust, particularly since they contain no acids, grit, pitch or gum or abrasive materials that might mar the work in process. They consist of vegetable fibre.

These meals are provided in four types: A—an almost pure cellulose fibre composed of the processed bagasse of sugar cane which, it is stated, will absorb 340 to 350 pounds of water per 100 pounds of material; B—treated cobs of Argentine eight-row flint corn, harder than the ordinary maple sawdust and will absorb 210 pounds of water per 100 of material, recommended for dry polishing after barrel burnishing; C—a combination of equal parts of products A and B to function as a combined drying out and polishing medium; D—Argentine white maize fibre, processed by steaming and exploding Argentine flint corn, then compressing and kiln drying the fibre and hammer milling into a semi-coarse fibrous material. This meal is intended specifically for polishing abrasives such as Vienna lime, crocus, rouge, etc., for deburring or dry treatment of the lighter gauge materials. All of these meals may be dried out and used over again.

Bright Zinc Plating In Barrels

The Mazic process of bright zinc plating in mechanical plating cylinders or barrels was developed to meet the demand for zinc deposits with high lustre by the Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturers of electroplating equipment and supplies. By this process the necessity for subsequent bright dipping is practically eliminated.

The solution recommended for use with Mazic is similar to the solutions generally used for barrel zinc plating, as follows:



H-VW-M barrel plater

Zinc cyanide—12 ounces per gallon of water

Sodium cyanide—4 ounces per gallon of water

Sodium Hydroxide—8 ounces per gallon of water

Mazic Brightener No. 3—3 pounds per 100 gallon of solution.

This solution will be found by analysis, after all the salts are dissolved to consist of

Zinc—6 to 7 ounces per gallon

Total Sodium Cyanide—14 ounces per gallon

Sodium Hydroxide—8 ounces per gallon.

Brightener should be dissolved thoroughly in *hot* water before being added to the plating bath. The solution can be analyzed easily by the method set forth in the booklet "Simple Method of Analyzing Plating Solution" for regular cyanide solutions, as published by the Hanson-Van Winkle-Munning Company.

To deposit one ounce of zinc, 23.3 ampere hours are needed. To deposit 0.001" zinc, 13/7 ampere hours are required. Apparatus must be supplied with current from a 10 to 12 volt source. At least 200 amperes should be drawn on the average sized barrel.

The best temperature for the operation of the Mazic barrel solution is around 85°F. In actual operation the temperature will rise because of the large amount of current going through the solution and when a bath is being operated continuously, provisions should be made for cooling. It is advisable and economical to circulate the solution. The cost of cooling and circulating equipment will be saved in a few months' operation by the saving in the sodium cyanide required to maintain the bath at proper concentration.

Only Mazic Anodes are recommended for this solution as they do not sludge; they keep the solution clear and the deposits free from roughness and other imperfection. Anodes are not chemically attacked when the solution is not being used, and therefore do not need to be removed when the solution is idle; also they do not polarize and consequently there is no polarizing film to remove. Ball anodes in spiral wire containers are recommended.

After the work is plated the cylinder should be taken from the plating solution, and rinsed immediately and thoroughly in clean cold water to avoid staining. After rinsing thoroughly in cold and hot water, the work is transferred to baskets, centrifuged and dried. If the parts are small and light, calling for a tumbling operation in sawdust, use only clean, heated hardwood sawdust.

It is difficult to estimate the thickness of deposit in barrel plating from a given plating time, because so many factors enter into the operation. It will depend upon the efficiency of the solution, the time of deposition, anode area, voltage and current obtainable, type of cylinder, temperature and the size, shape and load of the articles being plated. It is suggested that in plating to specification the load be made constant (approximately three-quarters of the weight or volume of the work considered a load in cadmium plating.) The current should be raised to the maximum and the thickness checked for various plating times by the dropping test (Hull & Strausser.)

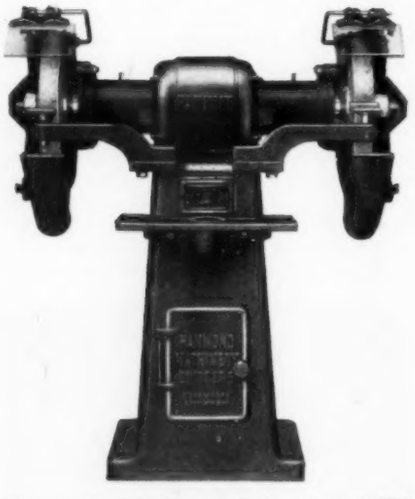
As in all bright plating operations, the brightness of barrel plated zinc depends somewhat on the lustre of the surface being plated. A good grade of cold rolled steel will give a better finish after being plated than, for example, pickled hot rolled stock. Gray and malleable iron castings have always been difficult to plate in any cyanide solution. Freshly sand blasted or rolled castings requiring only a weak acid dip usually plate satisfactorily, but a prolonged stronger acid dip may be necessary to remove oxide and rust, and they would change the surface of the work so that zinc would not deposit, or would deposit only on some areas.

Any impurities in any bright zinc plating solution have a highly detrimental effect. The material recommended for the barrels or cylinders is either Mercilite or hard rubber.

Wide Swing Grinders

The Hammond Machinery Builders of Kalamazoo, Michigan announce a new series of wide swing grinders to their grinder line.

The picture shows a 2 or 3 H.P. machine, but this series of grinders includes machines up to 7½ H.P. On the 2 and 3 H.P. machines, wheels are spaced 30" centers and spindle is 41" long overall.



Hammond wide-swing grinder, 2 or 3 H.P.

In the design of these grinders particular attention has been given to maximum space around the wheels to provide working space for the handling of bulky pieces.

On these wide swing machines totally enclosed motors are used, bearings are sealed against the entrance of abrasive matter, and shatter proof eye shields and magnetic starter with overload and low voltage protection are supplied.

These grinders are of special interest to those handling bulky pieces.

Emulsifying Agent for Buffing Compositions

Avirol WS has been developed by E. I. duPont de Nemours & Co., Inc., Wilmington, Dela., for use by manufacturers of rouges, buffing and polishing compositions, especially of the high quality type where the finest finish is required at a minimum cost.

Avirol WS is an anhydrous mixture of a wax-type fatty alcohol and a fatty alcohol sulphate. The latter is an emulsifying agent which adds very materially to the ease with which the buffing dirt is cleaned from the buffed article. The fatty alcohol is a lubricant and homogenizer which decreases the tendency of the abrasives to scratch and also blends with the other binders to produce a more amorphous and uniform cake.

The manufacturers recommend the addition of from 2 to 4% of Avirol WS to the composition. They state that it affords all the advantages that would result if soap could be satisfactorily incorporated in standard buffing compositions, without its inherent disadvantages. Avirol WS reduces surface tension, is practically moisture free and completely miscible with solid fatty acids, waxes, petroleum greases, etc. Buffing compounds containing this material can be more readily washed from the pieces of buffed metal.

Safer Polishing Machine

Lewis Roe Manufacturing Co., 1050 De-Kalk Ave., Brooklyn, N. Y., has put on the market a polishing machine designed to minimize accidents. This machine is equipped with a brake. When belt shifter is shifted to loose pulley, a locking device engages the brake and causes instantaneous stoppage.

An additional advantage is claimed for this machine. When brake is locked, buffs or wheels can be tightened at either end of spindle without the necessity of using a wrench on each end.

In addition to the brake, it is said to have seven other features: saves power; has a belt shifter, has Timken taper roller bearings; very rigid; weighs 225 lbs. to 425 lbs.; has Alemite grease cups; has outlet for draining superfluous oil, and bearings have take up for wear.

Roe polishing lathe

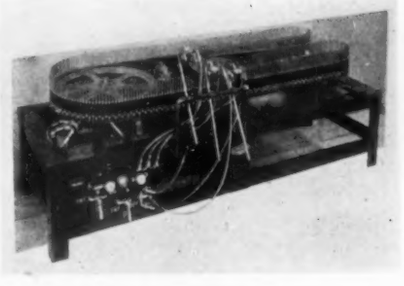
Automatic Finishing Machine

As many as three finishing operations and complete drying can be done automatically and continuously by the automatic finishing machine, recently developed by the Spray Engineering Company, 160 Central Street, Somerville, Mass.

Designed specifically for small machine parts, shell work, novelties, and similar items, this machine is said to be unusually compact and fast in operation, and to accommodate a wide variety of products. Finished items can be packed immediately on removal from the machine.

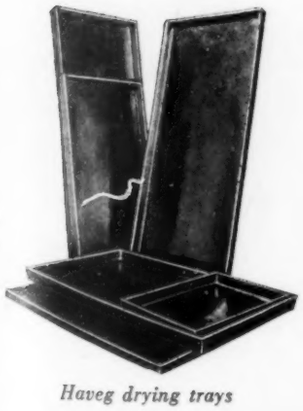
Several hundred vertical spindles are rotated as they pass through the sprays from the guns, which can be adjusted independently to provide complete coverage. Speed of operation can be adjusted to provide proper drying time.

In operation, the complete unit is enclosed by an exhaust hood and drying chamber. Spraco automatic finishing machines are furnished in many different types, sizes, and operating characteristics for special needs.



Sprayco automatic finishing machine

Acid Resistant Drying Trays



Haveg drying trays

A line of acid resistant trays has been placed on the market by the Haveg Corp., Newark, Dela. These trays are molded of Haveg phenolic resin asbestos composition which is highly resistant to acids and chemicals; a tough material that will stand considerable rough handling. It is also unaffected by high or low temperatures up to 265 deg. F., or by rapid changes in temperature.

It is stated that crystals separate easily from the surface of these trays and the low co-efficient of heat transfer facilitates even drying.

Haveg drying trays are available in practically any size as standard.

Tinning Material

"Tin-It" is a specially prepared concentrated tin combined with chromium, according to the manufacturers, The American Fluresit Co. Inc., 635 Rockdale Ave., Cleveland, Ohio. For convenience it is provided in powdered form.

Method of application is to mix with water and paint on the surface, then to apply a blow torch and wipe. It is recommended for use on all metals except aluminum and lead, and for vats, tanks, coils, etc.

Foreman's Conference Service

A new Foreman's Conference Service based on a series of talking still pictures that dramatize plant and personnel problems and it is stated, show proven methods of solving them, is now being marketed by MacVeagh & Co., 630 Fifth Ave., New York. This Foreman Service it is stated, applies for the first time to the training of men, the technique that has been used successfully by numerous manufacturers for the training of salesmen.

Among the subjects covered by the pictures are the following: "Safety Pays"; "Nickels and Dimes—Waste"; "Grievances and How to Handle Them"; "Quality and Costs"; "Mistakes and Errors."

Composition in Waxed Paper

Bruce Products Corp., 5712 Twelfth St., Detroit, Mich., announce a new departure in the manufacture of lime compositions. Their product, Li-Vac, is now marketed in a wax paper wrapping instead of the old fashioned foil lined or metal containers and called, "Wax-Pak Li-Vac". One of the advantages pointed out is that it can be used directly without any wrapping.

It is possible to use this new type of wrapping on a lime composition because Li-Vac is not made by the old fashioned method, poured while hot, but is treated in a vacuum, compressed and formed in one operation at constant temperature; thus, it is stated, producing a denser and more adhesive composition.

Lime composition wrapped in wax paper

Sawtooth Chromium Anodes

A new type of chromium anode has been placed on the market by Heil & Co., 3088 W. 106th St., Cleveland, Ohio, called the Sawtooth Lead Anode. This anode has a heavy central spine running down the full length, ½" thick, which connects directly with the hook for the purpose of increasing the life of the anode at the solution level where anodes fail first. The shape provides ten edges on one side to increase the throwing power and electrical efficiency. The angular construction gives the anode greater stiffness and resistance to buckling or warping. The anodes are made of extruded lead, giving much denser structure than cast lead and providing increased resistance to corrosion. The construction provides for more than 50% greater surface per anode than the flat anodes. The hooks are coated and integrally bonded to the lead anode to give a continuous metal conductor.

Heil saw-tooth anode

Asphalt Aluminum Paint

A new paint is being marketed which contains asphalt vehicle and aluminum powder, or paste, and serves a double purpose. After it is applied the asphalt vehicle will settle to the bottom and form a highly protective coat over the surface. This coat thoroughly waterproofs and prevents corrosion of metal surfaces and disintegration of concrete surfaces. The aluminum will come to the top and present the shiny lustre for which this paint is famous.

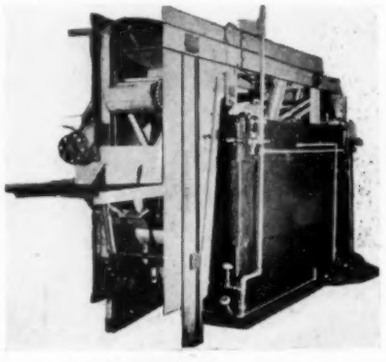
Lastik asphalt aluminum can be brushed or sprayed on, and can be applied to water tanks, grilles, fire-escapes, railroad cars and even to farm implements, toys, and various other items of like nature. It is produced by Lastik Products Company, Inc., American Bank Bldg., Pittsburgh, Pa.

Solvent Degreaser

The Auto-Solv is the trade name of the solvent degreasing machine designed by the Mechanical Process Corp., South Orange, N. J. It is intended especially for the degreasing and cleaning of automatic machine screw parts and small stampings. The parts are hopper fed to a traveling scroll conveyor bucket, which revolves and tumbles the work, separates it and gives it a complete washing. After the work passes through the last bath it is revolved slowly to remove entrapped solvent and alloyed to cool off slightly before being dumped into the chute and passing out to the waiting basket.

The principle of the cleaning method in the Auto-Solv is the "counter flow" in which the pure or clean solvent is the final rinse and the first bath is the dirty rinse. In this way, as the solvent becomes contaminated it is automatically replenished with clean solvent by the overflow from the ensuing bath. As the solvent flows from one bath to the next the oil content becomes greater, and finally in the lowest bath or the oil concentrator it is pumped through a filter to a special still incorporated in the machine. Here the oil and solvent are separated, the solvent vaporized and condensed to pure solvent, and the oil and grease drained off through a U seal at side of the machine. In this fashion the machine acts also as an automatic oil separator.

The company also provides chemicals for degreasing; D'Oilene "A" (trichlorethylene) and D'Oilene "B," a cheaper solvent which is suitable for certain purposes.



Auto-Solv degreaser

Portable Industrial Vacuum Cleaner

The United States Hoffman Machinery Corporation announces that it is now placing in production a radically new type portable vacuum cleaning unit.

The "Hoffco-Vac" Super-Duty Portable is an entirely new kind of portable cleaning unit, according to Lansing B. Hardtla, Hoffman's Air Appliance Division Manager. This new unit is a completely equipped, super-duty cleaner designed to remove large quantities of accumulated dust with economy. It is capable of many hours of continuous operation on heavy deposits of dust before it is necessary to stop work and empty the container. The dust container is equipped with a raising and lowering device actuated by a crank handle. It is mounted on a separate set of wheels, independent of those on which the unit is moved, and the unit pull-handle can be detached and used to pull the container.

The unit has sufficient capacity to operate two lines of 1½ inch hose of different lengths simultaneously, or one line of 2-inch hose. Complete information can be obtained from manufacturers, U. S. Hoffman Machinery Corporation, Air Appliance Division, 105 Fourth Avenue, New York, N. Y.

Anti-Static Sandblast Hose

A new construction of sandblast hose designed to overcome the accumulation of static has been introduced by The B. F. Goodrich Company, Akron, Ohio.

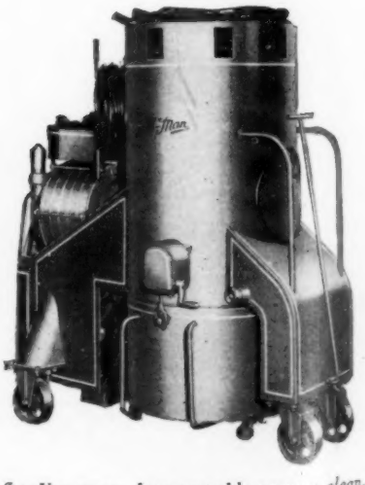
While this hose does not eliminate static,

Goodrich Anti-Static sandblast hose

it does provide a ground wire in the heart of the hose wall so that discharges of static tend to ground through the wire rather than through the body of the operator. Static punctures, instead of penetrating entirely through the hose wall, with disastrous results, reach only as far as the wire, permitting the hose to continue in service with little damage.

Wall thickness of this new sandblast hose is somewhat greater than the standard type to permit installation of the wire without materially reducing the cushion effect of the tube. Construction consists of a tube, one ply of fabric, wire coils embedded in rubber of the same quality as the tube, then three plies of fabric, and the cover.

Goodrich Anti-Static Sandblast Hose is available in sizes ranging from ¾ to 3 inches.



Hoffco-Vac super duty portable vacuum cleaning unit

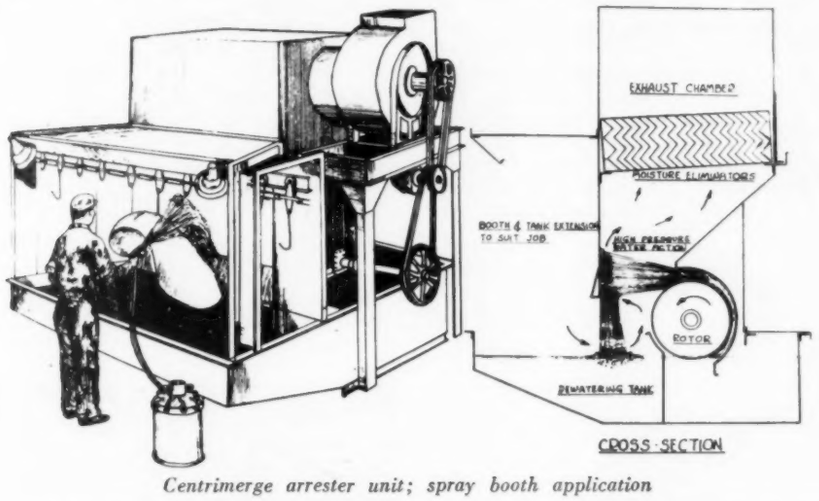
Wet Dust Arrester Unit

The Centri-Merge arrester unit designed and manufactured by Schmieg Sheet Metal Works, 312-320 Piquette Ave., Detroit, Mich., involves the use of a new and patented principle of removing foreign materials such as dusts, acids, paint pigments, etc. from exhaust air without the use of spray nozzles or pumps.

The fundamental principle consists of drawing the exhaust air to be cleaned through a high pressure water action in which the heavier particles are removed by a first stage high velocity vertical cataract of water and the finer material removed by the second stage of a high pressure water action which is moving at greater velocity than the air. This water action drives the air with great force against a front impingement sheet where the air bubbles in the water in which the fine dust travels are broken up and this fine material literally knocked out of the air. This water action is generated by a specially designed self cleaning motor driven rotor. This rotor handles 50 gallons of water per minute per 1,000 c.f.m.

This unit is applicable to spray booths, acid tank ventilation, dust collecting systems, or wherever dust concentrations or materials are to be removed from exhaust air.

The exhaust fan is always on the clean air side of the unit, thereby saving abrasive wear on the fan itself and in case of acid tank ventilation the fan is protected from acid vapors and corrosion.



Centrimerge arrester unit; spray booth application

These units are manufactured in sizes from 500 c.f.m. up to 50,000 c.f.m. The larger units, when used on dust or sand collecting systems, have a self contained dewatering tank and sludge conveyor which is an integral part of the unit, thereby saving the expense of a sludge pump and other additional equipment usually required for the disposal of sludge.

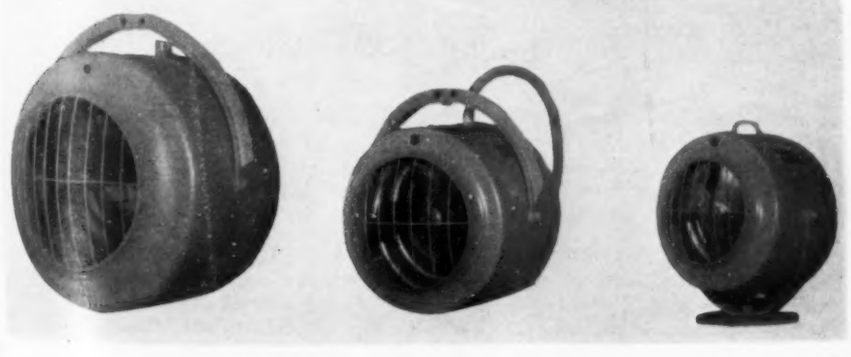
Industrial Heater

A larger forced-convection heater, much higher in heating capacity, was recently announced by the General Electric Co., Schenectady, N. Y., to add a heavy-duty, exclusively wall- or ceiling-mounted unit to the G-E line of industrial heaters. Including the new type, three physical sizes of heaters are now available: the small, portable size in ratings of 2, 3 and 4 kw.; the intermediate size, suspension style, in ratings of 5 and 7½ kw.; and the new suspension style in ratings of 10, 12½, and 15 kw. All heaters are available for 230 volts, 60 cycles—the small and intermediate sizes being single-phase and the large size, three-phase.

While the primary application of all G-E forced-convection heaters is directed space heating, the two smaller sizes can be utilized as air circulators or fans. This is made possible by use of switches provided for operating the aphonic, pressure-type fan independent of the heating element.

The line affords a wide range of heating capacities. The lowest rating—that of the smallest unit in the line—is projection of 200 cu. ft. of air per minute, at a velocity of about 700 ft. per minute. Capacity ranges upward through the different types until, in the case of the newly announced suspension type, volume is 1,590 cu. ft. per minute, with velocity of about 1,780 ft. per minute. Outlet temperatures remain nearly the same in all types and sizes.

Throughout the line, G-E Calrod heating units are brazed to strong radiating fins in order to assure the maximum in heat-transfer efficiency. The motor is totally enclosed, has sleeve bearings, and an ingenious baffle plate protects it from direct radiation. Thermostatic cutouts protect it from overheating by accident. If, for instance, some obstruction should be placed before the inlet or outlet, the automatic cutout would shut off the power.



G.E. forced convection-type unit air heaters

Metal Etch Solution

A metal etch solution is announced by Westinghouse Electric and Manufacturing Company for brass, copper and silver. It is a water solution of metallic salts which both etches and forms a permanent and pleasing black finish on these metals.

The solution is for application by rubber stamp, using a pad of felt or carborundum disc to moisten the stamp. The liquid will not cake or gum on the pad. Stamps may be cleaned easily by brushing with water. Impressions dry almost instantaneously in the air without heat, and their complete removal requires buffing.

In using this solution its corrosive nature should be kept in mind, and the hands should be washed immediately if the solution has touched them.

Further details may be obtained from the Special Products Division, Westinghouse Electric and Manufacturing Company, Bloomfield, N. J.

High Speed Shear

Illustrated here is a new high speed shear recently built by Libert Machine Co., Green Bay, Wisconsin. It is their Model 1036 arranged with a special lower cutting head that permits extreme flexibility in cutting formed pieces of sheet metal. It is especially adapted to trimming the flash from stampings after the first draw. The use of this shear eliminates the cost of trimming dies. Its use is said to be profitable on short runs, or when the formed piece is of rather large or bulky shape, such as automobile fenders, shown here with the machine. This machine is not a special machine entirely, as it can be used for cutting irregular shapes from

Libert high speed shear, Model 1036

sheet metal the same as any standard Libert high speed shear. No starting holes are required for inside cutting. It shears instead of punching the metal. The machine is absolutely accurate and no further finishing is required after cutting. It will cut on a formed radius as small as 5/8" up to 90°.

Acid Bucket

A new and improved Flexite Acid Bucket has recently been introduced by The B. F. Goodrich Company, Akron, Ohio, to provide greater safety for workmen who handle corrosive liquids.

This bucket is made of a semi-flexible material which, it is stated, will not crack or break under normal use. The reinforced bead on the base is not only enlarged but recessed to permit the worker to get a firm hold with his gloved hand. The capacity scale molded on the inside of the Flexite bucket provides a margin of safety to protect against spillage. When bucket is filled to capacity, liquid is still two inches from the top. Graduated marks also enable user to measure quantities accurately.

Flexite acid bucket

Flexite buckets are available in 3-gallon size only. They weigh only 3½ pounds each and are designed with steel or metal reinforced hard rubber handles.

Flexite dippers in one- and two-quart sizes can also be obtained and their use is recommended as an added protection against splashing and spilling.

Electrode Holder

A novel and effective electrode holder has been developed. It is made in three sizes to take rods from 1/16" to 3/8" diameter. A fibre handle, uniform for all sizes, is fitted with replaceable jaws. The design of the jaws permits quick insertion of rods in any position. Freedom from levers, springs and hinges makes it convenient to work in limited space. The handle is air-cooled and has a fibre heat-shield that protects the operator and prevents short circuit if the tool is laid down. These holders are well balanced and light in weight; the largest size weighs only 22 ounces. Combination cable connection permits either soldering or clamping, or both. Replaceable jaws are made of heat-treated spring steel, with

Delong-Cramer electrode holder

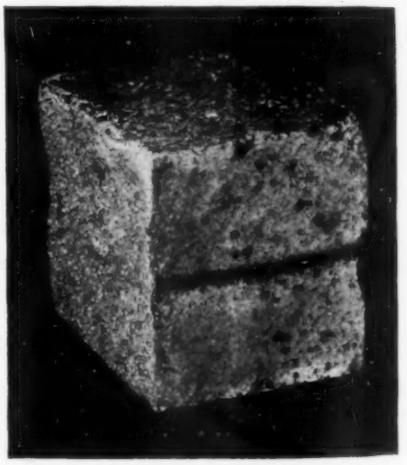
serrated faces to prevent electrodes from slipping. The handles can be used constantly and are not discarded when the electrodes need replacing. The manufacturers, Delong-Cramer Company, Southgate, California, have prepared literature describing the product, which is available on request.

High Temperature Cement

Sonittep No. 2900 high temperature cement was developed to provide a "low cost insurance on refractory life," by George F. Pettinos, 1206 Locust St., Philadelphia, Pa. It is an alumina-silica base cement possessing the same characteristics and approximately the same expansion and contraction as fire-clay brick. It is usually furnished in ready mixed form, stays in suspension in the drum, and works easily and smoothly. Where desired it can be furnished in dry form.

Sonittep No. 2900 has a quick strong air-bond and maintains a non-shrinkable joint between the brick from room temperatures to temperatures well above 2900°F.

Thinned with water to the consistency of cake batter it forms a protective coating for fire-clay brick and for washcoating the daub linings of small ladles. It can be used in combination with crushed brick or fire-sand to form a patching material for slag holes, tap holes, and for repairing forehearths.



Sonittep No. 2900 *high temperature cement*

Sonittep No. 2900 is recommended for any place where fire brick, silica brick or high alumina brick are to be bonded.

Rustproofing Material

Rustex, a concentrated chemical designed to prevent rust, has been developed by the Rustex Company, 112 S. Maple Ave., Oak Park, Ill. It is said to be not only a rust preventive, but also to dispose of corrosion and verdigris on non-ferrous metals including brass, zinc and aluminum. According to the manufacturers, Rustex does not coat the surface of the metal but changes its character. It will also act as a priming coat or pre-treatment for metal surfaces which are later to be covered with finishes like paint, enamel, etc., preventing the formation of rust beneath these films and chipping, flaking or peeling of the finish itself.

Rustex is recommended for a variety of metal products including steel cabinets, automobile parts, advertising signs, calculating machines, caskets, iron beds, etc., and for metals and alloys including brass, bronze, copper, Sterling silver, stainless steel, nickel silver, zinc, aluminum, iron, etc.

NICKEL DOES A *Sweet* JOB...

..IN PRODUCING SOUND BRONZE CASTINGS *Honeycombed* WITH PASSAGES

How the Ritter Company avoids rejections and cuts machining costs in intricate dental equipment.

Valve casting for distribution of water in Ritter dental equipment. Note number and size of passages, also dense and uniform structure of the Nickel alloy bronze, in cross-sectional view.

THAT smart non-ferrous foundrymen are profiting by the use of Nickel, is evidenced by many new reports. Latest of these is news of all-around improvement effected by Ritter Dental Mfg. Co., Inc., of Rochester, N. Y. in dental "cuspidor" castings of Nickel bronze.

Previously cast in common 85-5-5-5 red brass composition, this part centralizes distribution of water to flush the cuspidor bowl, operates the ejector, and supply water to the tumbler of the Ritter Dental Cuspidor. It is necessarily small and compact – weighs only 2½ lbs. – yet is honeycombed with passages.

Foundry rejections on an intricate casting of this type usually run high. In addition, shrinkage, porosity and other imperfections which show up after some machining expense has been incurred, add to machine shop costs.

By using an 85% copper, 4% tin, 5% lead, 5% zinc and 1% Nickel mixture, notable improvements resulted: the density and uniformity of structure improved so greatly that foundry rejections were reduced to a minimum and machine shop costs substantially lowered.

Consultation on casting problems involving the use of Nickel Brass and Bronze Alloys is invited.

NICKEL BRONZE CASTINGS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Watch for the Coming Issues of Metal Industry!

The April issue of Metal Industry will contain the reports of two important meetings—the *Regional and Committee* meetings of the *American Society for Testing Materials*, and the semi-annual meeting of the *British Institute of Metals* in London. The papers and discussions at these meetings are always full of meaning for the metal industries.

Other articles of timely interest scheduled for April and the succeeding issues are the following:

Methods of Joining Copper Alloy Products. Part 5: Sheets. A continuation of this exhaustive series on welding, by *I. T. Hook* of the American Brass Company.

Cost and Control of Polishing Supplies, by *Chas. W. Hardy*, industrial consultant, New York. How these costs are obtained and used for ordering and cost finding in metal products manufacturing.

Wastes in Metal Finishing Operations. A plea for careful, close control, electrical, mechanical and chemical and a list of all the operations showing where wastes occur, by *Philip J. Lo Presti*, electroplating chemist.

Metal Pictures of Electroplating. Artistic reproductions, a new specialty for the electroplater, by *C. P. Treppe.*

Fifty-three Years as an Electroplater. Reminiscences by a retired pioneer from the early days to the present, by *D. W. Robinson*, formerly supervisor of finishes, Remington-Rand, Inc., Ilion, N. Y.

Galvanoplastic Reproductions for Metal Molds. A process which has become important in the manufacture of grilles, lighting fixtures, tablet bas reliefs, patterns, phonograph records and other productions, by *George Schore*, electroplater and finisher.

A review of the New Equipment and Supplies reported in 1937 for the metal products manufacturing, plating and finishing industries.

Control of Electroplating Processes, by *S. C. Taormina*, technical director, Industrial Research Corp., Brooklyn, N. Y.

Hot Dip Galvanizing Practice. Pickling, galvanizing and protection of surfaces by lacquering have shown important improvement. By *W. G. Imhoff*, consulting engineer, Vineland, N. J.

Watch for the Coming Issues of Metal Industry!

What the Reader Says

Rhodium Plated Reflectors

In reading your February issue of METAL INDUSTRY I find that the article by M. W. Schwarz, Chemical Engineer, entitled "Metal and Metal Finishes Aboard Ship," mentions the new reflector employed by Portable Light Company, New York City, in their 13-inch and 20-inch searchlights.

I should like to point out that the Bart Process is not one of depositing rhodium on glass and backing with electro-deposited copper as he mentioned. The reflector is, however, of completely electro-deposited copper and has a surface of rhodium.

Since we are the manufacturers of this reflector, we should like to have its correct structure understood and would appreciate your amending this error.

Belleville, N. J.
Feb. 11, 1938,

BART LABORATORIES
S. G. BART,
Chemist.

Couldn't Be Without It

Editor, METAL INDUSTRY:

May I express my appreciation for your publication. I do not know how anyone in the metal business could be without it.

R. R. MARCHISE

Cleveland, O.
Feb. 23, 1938.

Plating in Spite of High Water

Editor, METAL INDUSTRY:

I want to tell the country about the flood we had in Louisville, Ky., on Thursday, January 21, 1937. The water began backing up in the sewers. We operate a polishing and plating department in a basement. By afternoon we began putting down boxes to stand on. We worked up until 5 P. M. that day in water. About 8 P. M. the superintendent, *O. T. Lawson*, called me on the phone and informed me that the water was coming in the back door so fast that they would have to get out. They were moving motors, dynamos, polishing material and everything they could put their hands on, up to the second floor.

The next morning I reported for work as usual at 7:30 A. M., and we couldn't get within a block of the shop. Now that meant that the basement had twelve feet of water in it and the river was still rising. By the following Wednesday there was 18 feet of water in the shop and that meant that my department was 18 feet under water. I was marooned at Highland Park, Ky., but as soon as I could get mail out I wrote the boss where I was.

I operate at our plant, 2 nickel tanks, one copper, one chrome. I thought surely

the solutions were ruined, being 18 feet under water and gave Mr. Lawson a list of what we would need to make new solutions. These tanks were under 18 feet of water for two weeks. When the water went down, the firm put a gang of men to work cleaning up the mud and silt. I came in and worked one week cleaning the plating room equipment such as connections, rheostats, etc. The following week I took off and went to St. Louis where I spoke to *Edward Musick* of the Musick Plating Works, and told him of my experience.

When I got back we had gas, water, electricity and sewer service so I went to work. But now comes the mystery. Believe it or not, but I am operating the same solutions today, one year after the flood, which I did before the flood. I never lost an acid dip, nickel strip or oxidized dip. The tanks were not cleaned until September 1937.

Louisville, Ky.
January 25, 1938.

GEO. W. NOLLMAN, Foreman,
Polishing & Plating Dept.,
Stimpson Computing Scale Co.

New Books

Porcelain Enameling, edited by J. E. Hansen, Service Director, Ferro Enamel Corp., Cleveland, Ohio. 520 pages. Published by Enamelist Publishing Company. Price $5.00.

The new volume makes use of some material from its predecessor, *The Advanced Technique of Porcelain Enameling*, also edited by Mr. Hansen and published five years ago, but most of the text is new, made necessary by the many recent developments and improvements in the industry. At the back of the *Manual* are tables of useful data and an Enameler's Dictionary, a complete glossary of the technical jargon of laboratory, smelter, mill room and furnace room.

Some of the chapter headings are: History of the Art; Design and Fabrication of Sheet Iron Parts; Cast Iron for Enameling Purposes; Preparation of Metal Surfaces; Enamel Mill Room Practice; Mill Additions; Water and Air Supplies for Enameling Plants; Application of Enamel; Drying; Brushing; Enameling of Signs; Enameling of Hollow Ware; Burning; Inspection; Decorative Effects; Shop Troubles; Process Control; Muffle Furnace Atmosphere and Temperature Gradient Effects; Fuels and Their Combustion; Enamel Shop Construction, Equipment and Layout.

Transactions of the American Foundrymen's Association. Published by the American Foundrymen's Association, 222 W. Adams St., Chicago, Ill. Volume 45, 850 pages; size 6 x 9; price $10.00.

This volume includes papers and committee reports presented at the 1937 convention of A.F.A. in Milwaukee, Wis. Included in the contents are papers devoted to various phases and practices in the different branches of the foundry industry. Non-ferrous foundrymen will be interested in papers on sand control, the production of pressure-tight 30% cupro-nickel castings, a discussion of problems in the manufacture of bronze castings, and non-ferrous foundry cost methods.

In addition, there are many papers of general interest such as those on refractories, radiography, etc.

The rear of the book contains a ten page cross index of the material contained together with an author's index. Illustrations and tables are used generously throughout the book in the various papers to bring to the reader a clear understanding of the various subjects under discussion and for the correlation of information.

Proceedings of the Institute of Metals of Great Britain. Edited by G. Shaw Scott, 36 Victoria St., Westminster, London, S. W. 1, England. 332 pages; price £1, 11s, 6d.

The latest volume issued by the Institute of Metals consists essentially of a record in permanent form of the proceedings at the recent meeting in Sheffield together with additional papers not read at that meeting. It includes the autumn lecture on Metallurgy and the Aero Engine contributed by Dr. D. R. Pye.

The purely metallurgical papers included in the present volume cover a wide field, as is indicated by such titles as "The Methods of Testing Zinc Coatings," "The Mechanical Properties of Some Metals and Alloys Broken at Ultra High Speeds," "Precision Extensometer Measurements on Tin," and "Alloys of Magnesium." A Swedish engineer, Dr. Hermann Unckel, contributes a valuable paper dealing with the effect of cold rolling on the structure of alloys.

The above papers were abstracted briefly in METAL INDUSTRY for October, 1937, pages 501-2.

Technical Publications

A Study of Some of the Factors Controlling the Porosity of Hot-Tinned Coatings on Copper, by W. D. Jones. Series A, Number 70. International Tin Research and

Development Council, 149 Broadway, New York.

Some Differences Between the Structure of Electrodeposited and Hot Dipped Metal Coatings, by D. J. MacNaughtan. Series A, Number 67, International Tin Research and Development Council, 149 Broadway, New York.

Stannic Oxide as Opacifier in Wet Enamels, by Dr. L. Stuckert. Series A, Number 65. International Tin Research and Development Council, 149 Broadway, New York.

The Influence of the Difference of Orientation of Two Crystals on the Mechanical Effect of their Boundary, by Bruce Chalmers. Series A, Number 68. International Tin Research and Development Council, 149 Broadway, New York.

The Colorimetric Determination of Tin by Means of Toluene-3: 4-dithiol ("Dithiol"), by R. E. D. Clark. Series A, Number. 69. International Tin Research and Development Council, 149 Broadway, New York.

Government Publications

Social Security in America. The factual background of the Social Security Act as summarized from staff reports to the Committee on Economic Security. Social Security Board, Washington, D. C.

Lead Industry in 1937—Advance Summary. Bureau of Mines, Washington, D. C.

Copper Industry in 1937—Advance Summary. Bureau of Mines, Washington, D. C.

Zinc Industry in 1937—Advance Summary. Bureau of Mines, Washington, D. C.

Proposed Commercial Standard for Marking of Articles Made Wholly or in Part of Platinum. Proposed by the Jewelry Crafts Association, and based on the New York Platinum Law and the corresponding laws of Illinois and New Jersey. TS-2447, dated January 28, 1938. Obtainable from I. J. Fairchild, Chief, Division of Trade Standards, National Bureau of Standards, Washington, D. C.

Check Sheet: Introduction of New Industrial Products; Market Research Series No. 6. Price 10c. Obtainable from the Bureau of Foreign and Domestic Commerce, Washington, D. C.

Cadmium Industry in 1937 — *Advance Summary.* U. S. Bureau of Mines, Washington, D. C.

Associations and Societies

American Electro-Platers' Society

90 *Maynard St., Springfield, Mass.*

Plans for the Annual Convention to be held in Milwaukee, Wisc., June 13-17, 1938, are progressing rapidly. Below is a partial list of the speakers and the papers to be heard.

Walter Meyer, General Electric Co., Bridgeport, Conn.

SUBJECT: *The Effect of Metallic Impurities on the Structure of Cyanide Copper Deposits.*

George B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.

SUBJECT: *History of Metal Coloring.*

Floyd Oplinger, R & H Chemicals Div., of DuPont Co., Niagara Falls, N. Y.

Anderson Branch—Rochelle Salts Copper Baths.

Springfield Branch—Answers to 101 *Questions on Copper Plating.*

Detroit Branch—Electroplating Solves Many Manufacturing Problems.

Newark Branch—Wetting Agents in Plating Solutions.

Hartford Branch—Dips and Uses in Cleaning Cycle.

The Milwaukee Branch held a dance followed by a buffet lunch, at the Schroeder Hotel on Saturday, February 12, for the members and their wives. The purpose was to appoint the Ladies' Committee for the 1938 Convention. This has been the first time in a good number of years that the members and their wives have been brought together to really get acquainted and was met with such great approval that we feel there will be more events of this nature held in the future.

The gathering was well attended and the spirit and enthusiasm that the ladies demonstrated by accepting to serve only assure us of what we said before; that this will be truly a great convention.

R. M. Goodsell, General Chairman, appointed the following ladies to act on the committee.

General Chairman
MRS. JACK GEISSMAN
Committee Chairmen

Mrs. Robert Steurnagel
Mrs. R. M. Goodsell
Mrs. Al Hermansen
Mrs. Dexter Rhodes
Mrs. Phil Ritzenthaler
Mrs. William Geissman
Mrs. Roman Lipinsky
Mrs. Jos. Bykowski
Mrs. Dan Wittig
Mrs. Frank Marx
Mrs. M. McGuire
Mrs. Henry Bornitzke
Mrs. Harry Unke
Mrs. Robert Steurnagel, Jr.
Mrs. Rodney Olson
Mrs. Robert Goodsell

American Foundrymen's Association

222 W. Adams St., Chicago, Ill.

Molding and Pattern Making Contests which have met with such success in the past will again be held at the 1938 Convention in Cleveland, Ohio, during the week of May 16th. Copies of the regulations can be secured by writing directly to the American Foundrymen's Association at the above address.

Northeastern Ohio chapter is making extensive plans for the combined convention and exposition. This chapter which has its headquarters in Cleveland, has a membership of more than 200.

A large welcoming committee has been appointed with the responsibility of extending the hospitality of the convention city to the members. Other committees including plant visits, finance, publicity, etc., have also been appointed and the arrangements for the convention program, both technical and social, are being carried forward at full speed.

Officers Nominated

The nominating committee of the American Foundrymen's Association met in the headquarters office, Chicago, Thursday, February 10, and designated the following officers and directors:

For President to serve one year:
Marshall Post, Vice President, Birdsboro Steel Foundry and Machine Co., Birdsboro, Pennsylanvia

For Vice President to serve one year:
H. S. Washburn, President, Plainville Casting Co., Plainville, Connecticut

For Directors to serve three years each:
Hyman Bornstein, Director of Research, Deere & Co., Moline, Ill.
F. A. Lorenz, Jr., Vice President, American Steel Foundries, Chicago
D. O. Thomas, General Manager, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.
G. A. Seyler, Works Manager, Lukenheimer Co., Cincinnati, Ohio
H. S. Hersey, Vice President, C. O. Bartlett & Snow Co., Cleveland, Ohio

Connecticut Non-Ferrous Foundrymen's Association

SECRETARY, LOUIS G. TARANTINO, 670 WEST JACKSON AVENUE, BRIDGEPORT, CONN.

The meeting of this association was held Jan. 18, 1938 with dinner at the Hotel Duncan, New Haven, presided over by *H. A. Phelps*, President.

After dinner the meeting was adjourned to the Mason Laboratory of Yale University for a joint session with the New Haven Section of the American Society of Mechanical Engineers, whose local Chairman is *M. J. Rodecki* of the *Henry G. Thompson Co.*, New Haven.

Geo. R. Holmes of the *McLagon Fdy.*, New Haven, presented the Engineer's point of view and *F. B. Diana* of *Whipple & Choate Co.*, Bridgeport, led the discussion of the foundryman's problems, calling on various foundrymen to explain their problems to the designers.

The subject of the technical session was *"Casting Design & Alloy Specification."* Most important point brought out was the desire for a closer co-operaion between the designer, patternmaker and foundryman during the formative stages of a piece of work to be cast. This would result in fewer foundry rejects and less inclination for the foundryman to place the blame of defective castings with the designer.

The meeting of Feb. 15, 1938 was held at the Hotel Duncan, New Haven, Conn., presided over by our President, H. A. Phelps.

The speaker for the evening was *R. W. Reinicke* of the *Chase Brass & Copper Co.*, Waterbury, Conn. who spoke on *"Forgings & Pressure Castings vs. Sand Castings."*

The next meeting will be held March 15th, 1938 at the Hotel Duncan, New Haven and the speaker will be *E. Parker Mott* of the *Metal Hose & Tubing Co.*, Brooklyn, N. Y., who will talk on *"Modern Melting Equipment and Furnace Improvements."*

Pres. H. A. Phelps appointed *Geo. King* of Malleable Iron Fittings Co., Branford, Conn. as chairman in charge of the April meeting. It will be his duty to select a subject and provide a speaker.

Foundry Equipment Manufacturers

1213 *West Third Street, Cleveland, Ohio.*

The Foundry Equipment Manufacturers Association held its annual meeting in Cleveland, on Tuesday, February 8th. At that time a session was devoted to the consideration of business conditions and prospects and effect on foundry equipment industry. Other subjects discussed were as follows: "*Foundry Equipment Builders and the Government,*" by *Lewis M. Lind,* Chief, Machinery Division, U. S. Dept. of Commerce, Washington, D. C.; *Present Day Cost Considerations,* by *Albert E. Grover,* Cost Consultant, Cleveland, Ohio; *Wage and Employment Conditions in Foundry Equipment Industry; Progress in Safety and Hygiene Codes,* by *Dan M. Avey,* Secretary, American Foundrymen's Association.

Electrochemical Society, Inc.

Columbia University, New York.

The Savannah meeting of the Electrochemical Society will be held April 27-30. This meeting will include a Scientific-Technical Session on Electrodeposition; also a similar session on the Electric Furnace. *D. H. Bissell* of the Chromium Corporation of America will present a paper on *Chromium Plating for the Paper Industry.*

Copper & Brass Research Association

420 Lexington Ave., New York

The *National Brass & Copper Company, Inc.,* of Lisbon, Ohio, has filed application for membership in the Copper & Brass Research Association, which will be accepted at the next meeting of the Executive Committee.

The National Brass & Copper Company is one of the leading manufacturers of plate, sheet, strip and rolled copper. *W. D. Hart* is President and *George W. Case* is Vice President & Sales Manager of the company.

The membership of the Copper & Brass Research Association now represents companies manufacturing more than 88% of products fabricated from copper and its alloys, and comprises the following organizations:

The American Brass Company, Waterbury, Conn.

Bridgeport Brass Company, Bridgeport, Conn.

Chase Brass & Copper Co., Incorporated, Waterbury, Conn.

C. G. Hussey & Company, Pittsburgh, Pa.

Mueller Brass Co., Port Huron, Mich.

National Brass & Copper Co. Inc., Lisbon, Ohio.

Phelps Dodge Copper Products Corporation, New York, N. Y.

Revere Copper and Brass Incorporated, New York, N. Y.

Scovill Manufacturing Company, Waterbury, Conn.

Wolverine Tube Company, Detroit, Mich.

American Welding Society

33 W. 39th St., New York

The Welding Lecture Course announced in our January issue, began on Tuesday, January 11th. Lectures will be held weekly up to and including March 29, on the subject of the fundamentals of welding design, at the Polytechnic Institute of Brooklyn, 99 Livingston St. Detailed information can be obtained from the secretary of the Society at the address above.

Jewelers Board of Trade

413 *Turks Head Building, Providence, R. I.*

The Annual Meeting of the members of the Jewelers Board of Trade was held on January 28th at the offices of the Association, *Frederick A. Ballou, Jr.,* president, presided over the meeting and made an interesting address. The Jewelers Board of Trade had a good year financially in 1937. In spite of the rather abrupt decline in the sale of jewelry in many quarters at the end of the past year, the Trade looks for a good year in 1938.

At a meeting of the Board of Directors of The Jewelers Board of Trade on February 18, 1938, the election of officers and a member of the Executive Committee was held:

President—Frederick A. Ballou, Jr., B. A. Ballou & Co., Inc., Providence, R. I.

First Vice President—Russell G. Scott, Reed & Barton Corp., Taunton, Mass.

Second Vice President—Edgar E. Baker, W. R. Cobb Co., Providence, R. I.

Secretary and Treasurer—Horace M. Peck.

Assistant Secretary and Assistant Treasurer—Robert C. Knox.

Howard L. Carpenter of The Albert Walker Company, Providence, R. I. was elected a member of the Executive Committee, which now consists of the following: *Frederick A. Ballou, Jr., Royal J. Gregg, Howard L. Carpenter.*

Western Metal Congress

PAN-PACIFIC AUDITORIUM, LOS ANGELES, CALIF.

Based on the theme, "Metals in Industry," the Western Metal Congress and Exposition, March 21 to 25 in the Pan-Pacific Auditorium and Biltmore Hotel, Los Angeles, is expected to attract 3,000 executives, plant operators, metallurgists and superintendents to the Congress and many thousands to the exposition.

The exposition, held in Los Angeles eight years ago, was attended by 60,000, but *William H. Eisenman*, secretary of the American Society for Metals, said an earnest effort will be made to eliminate the curosity seeker and to attract only 25,000 interested men, who are definitely connected with the fabrication of industrial metals.

Eighteen national technical societies are co-operating in the double event.

Particular attention will be paid by the Congress to metals used in the petroleum, aviation, general manufacturing, chemical and mining industries. Speakers from all parts of this country will participate in the educational program, reading papers on casting technique and new advances in the use of aluminum alloys, copper alloys and die castings; machineability of aluminum and other alloys; controlled atmospheres; welding, etc.

Personals

Franklyn J. MacStoker

Franklyn J. MacStoker has accepted a post with A. Robinson & Sons, 131 Canal St., New York, manufacturers of gold plating solutions for the trade.

F. J. MACSTOKER

Mr. MacStoker is one of the outstanding figures in the ranks of the plating industry. He learned the rudiments of his profession in New York manufacturing plants and in the silverware industry in New England. For six years he was assistant foreman and gold plater with the Imperial Metal Mfg. Co. of Long Island City. He was later foreman of gold finishing with the Benziger Bros. Co., New York. For a time he acted as traveling representative of the Magnus Chemical Co. in western New York, and then went with the Sterling Bronze Company of New York, to take charge of their plating and coloring operations. For a time he was in charge of plating operations of the night force of the American Safety Razor Co., Brooklyn, N. Y. His most recent post was that of foreman of the plating and galvano departments for the Medallic Art Co. of New York.

Mr. MacStoker has been one of the most active and concientious workers in the American Electro-Platers' Society for the past fifteen years. A member of the New York Branch, he served as president of that branch from 1927 to 1930 and as secretary-treasurer from 1934 to 1938. He has served on numerous committees of the national society. In 1937 he was general chairman of the Silver Jubilee Convention Committee, in charge of arrangements for the convention which was held in New York.

At that meeting he was elected first vice-president of the American Electro-Platers' Society.

Mr. MacStoker's many friends wish him every success in his new connection.

Phillips Lecture on Electroplating Operations

A meeting of the American Section of the Society of Chemical Industry, jointly with the American Chemical Society, was held on the evening of Friday, February 11th, at The Chemists' Club, 52 East 41st Street, New York City. *James G. Vail* was the Chairman. The guest speaker was *William M. Phillips* of the General Motors

Corp. who gave a "Graphic Presentation of Electroplating Operations."

The object of the presentation was to show the mechanics of electroplating, or electrodepositing operations. Small glass tanks were used in a projectoscope. These tanks contained plating solutions, in which were suspended anodes and cathodes. This was placed in the projectoscope and a magnified image thrown on a silver screen. Suitable direct current was applied to the anode and the cathode. The solution of the anodes was visible, as was the formation of metal on the cathodes. The depletion of metal in the solution at the cathode showed quite clearly. The amount of gas evolution showed the relative efficiency of the respective plating baths through behavior on the anode and cathode.

The elimination of pitting of nickel deposits by reduction of surface tension and by addition of suitable wetting agents was shown. An experiment was made to show that SO_4 ion alone in chromium plating is not effective until combined with chromium metal. Chromium was deposited on metal foil and showed the effects of inter-crystal tension by bending the foil.

W. M. PHILLIPS

William Phillips was born on September 9, 1889 in Aspen, Colorado. He spent the very early years of his life in a small mining town in the mountains of Colorado and later moved to central Pennsylvania. He graduated from the Alexandria High School and Mercersburg Academy. He majored in Chemical Engineering at the University of Pennsylvania. On leaving the University he was employed by the Philip Carey Company of Cincinnati, Ohio, and soon became Sales Manager of the Roofing Division. In 1913 he went with the Baltimore Tube Company, first as Chief Chemist and later as Manager of a division which manufactured articles of copper by electrodeposition. This division later became the Inland Manufacturing Company. Mr. Phillips became General Manager of this company. After the war he was employed by the General Motors Corporation. His duties consist of production engineering in an advisory capacity on plating, painting and enameling, and committee activities on the specification of materials.

Mr. Phillips is a member of the American Society for Testing Materials, The Electrochemical Society, the American Electro-Platers Society and other technical associations. He has presented many talks before the American Electro-Platers Society, The Electrochemical Society and other organizations. These have been published in the proceedings of those societies. His paper on the Pictorial Presentation of Electroplating was awarded the Founders Medal Award of the American Electro-Platers Society.

Believe it or Not! An Industrial Fish Story

Here's one for the book.

Mr. Fish of the American Steel & Wire Company of Worcester, Mass., recently called *Mr. Pike* of the Hanson-Van Winkle-Munning Company, Matawan, New Jersey, who called *Mr. Herring* of the Hanson-Van Winkle-Munning Company in Pittsburgh, Pa., who called *Mr. Trout* of the Bethlehem Steel Company, Johnston, Pa., in order to make an appointment between *Mr. Fish* and *Mr. Trout.*

The appointment was made, but who caught what and how big it was, nobody will ever find out!

According to *C. W. Yerger,* Vice President of the Hanson-Van Winkle-Munning Company, our authority for this story (and we all know how reliable he is), this "affair" did not happen on April 1st.

Walter H. Bruckner has been appointed research associate in metallurgical engineering in the Department of Mining and Metallurgical Engineering in the Engineering Experiment Station of the University of Illinois. A graduate of Columbia University and an experienced research worker, Mr. Bruckner comes to Illinois from the United States Naval Research Laboratory in Washington, D. C., where he has been engaged in metallurgical research.

Darin B. Hill has been appointed by the Chain Belt Company of Milwaukee, Wis., as a Sales Engineer specializing in foundry systems. He will be located at Chain Belt Company's Chicago office and will cover the Middle West generally.

John H. Holzbog, Personnel Director of Chain Belt Company, Milwaukee, Wis., was the recipient of the Milwaukee Junior Chamber of Commerce Distinguished Service Award. Presentation was made at the January meeting of the Junior Chamber. Similar awards are made by Junior Chambers of Commerce in all important cities to men in the local communities, under 36 years of age, who during the year have made outstanding public service contributions.

The award given Mr. Holzbog was in recognition for his services in promoting industrial safety.

Frank H. Dewey, general manager of the air conditioning division of *Gar Wood Industries*, Inc., Detroit, was appointed president of the Oil Burner Institute at a special meeting of the board of directors to fill the unexpired term of *Charles M. Lockwood* of Rock Island, Illinois, who resigned.

Frank H. Dewey, general manager of the Air Conditioning Division of *Gar Wood Industries, Inc.*, Detroit, Mich., has announced the appointment of *Jerome H. Nymberg* as manager of the Detroit air conditioning branch to succeed *Norman Saylor* who is no longer connected with the company.

W. P. Witherow, president of the Blaw-Knox Company, Pittsburgh, has announced the appointment of *N. B. Ornitz* as president of the Power Piping Division of the Blaw-Knox Company, and of *W. N. Quartz*, as vice president in charge of operations. Mr. Ornitz, a director and a vice president of the Blaw-Knox Company, will also continue the management of the National Alloy Steel Division of the Blaw-Knox Company.

J. S. Grindley, western sales manager for the Watson-Stillman Company, Roselle, N. J., moved from Columbus to Detroit, where the district sales office of the company is now located.

Edward O. Goss, president, Scovill Mfg. Company, Waterbury, Conn., completed 50 years of continuous service with the company on February 10, 1938. A resolution of congratulations was forwarded to him by the Board of Directors. Mr. Goss entered as a draftsman and made his way up step by step. On February 8th Mr. Goss was host to 14 employees who have been identified with the Scovill Manufacturing Company for a period of 50 years or more.

Henry C. Limbach, formerly with the Fredericksen Co., Saginaw, Mich., has become associated with the Riverside Foundry and Galvanizing Co., 508 Harrison St., Kalamazoo, Mich., in the capacity of directing sales and engineering for the nonferrous division. Departments: bronze, brass and aluminum foundry; zincing (galvanizing).

Sam Tour, vice president, Lucius Pitkin Inc., 47 Fulton St., New York, delivered an address on Monday, February 21st, before a meeting of the Metropolitan Chapter of the American Foundrymen's Association, held at the Essex House, Broad St., Newark, N. J., on the subject of "*Non-Ferrous Casting Defects—Their Causes and Cures.*" Mr. Tour listed 22 different types of defects in castings and showed how they were caused by one or more of ten different causes.

Obituaries

Hubert L. Johnston

Hubert L. Johnston, president, Hobart Manufacturing Company, Troy, Ohio, died January 22nd from pneumonia following an extended illness. Mr. Johnston, a director of Miami Conservancy district was 69 years old. He was a native of Washington, Ind.

C. Edward L'Hommedieu

C. Edward L.Hommedieu, vice-president of the Chas. F. L'Hommedieu & Sons Company, manufacturers of plating and polishing supplies, Chicago, Ill., died at his home in Oak Park, Ill., on January 27th, following a brief illness. He is survived by a wife, daughter and two brothers.

Mr. L'Hommedieu was born in 1875 at Meriden, Conn., the son of Chas. F. L'Hommedieu, founder of above mentioned firm. He attended school at Meriden, Conn., Philadelphia, Pa., and Rockford, Ill. Shortly after his father started in

C. EDWARD L'HOMMEDIEU

Business, Edward joined him in the firm and was active all his life in the sales department.

Mr. L'Hommedieu was one of the leaders in the electroplating industry. His loss will be deeply felt by the large number of friends that he had made throughout the country.

Edwin Park Root

Edwin Park Root, 77, one of Connecticut's distinguished citizens and chairman of the board of directors of the New Haven Clock Co., died recently at the New Haven hospital following an attack of pneumonia. Mr. Root had undergone an operation.

Mr. Root was a native of the Elm City, the son of Lafayette F. Root and Elizabeth Benham Root. He was educated in his native city and entered the employ of the New Haven Clock Company at the age of 14 years. Upon the death of Walter Camp in 1923, he became president. In 1929 he relinquished most of his duties and entered into partial retirement but maintained his position as chairman.

Verified Business Items

Motor State Products Co., Ypsilanti, Mich., is the name of the reorganized company, formerly the *Golde-Patent Manufacturing Co.* The *Motor State Products Co.* has taken over the assets, liabilities, trade name, good will, personnel and organization of the old concern.

Milwaukee Metal Spinning Co., 1325 S. 43rd St., Milwaukee, Wisc., has increased its facilities by building an addition which added about 10,000 sq. ft. of floor space. Departments: cutting-up shop, spinning, soldering, brazing, grinding, polishing and buffing and lacquering.

Di-Mold Corp., 109 Webb St., Dayton, Ohio, manufacturers of match plates, patterns, etc., is the new name given to the reorganized company which was formerly the *Di-Mold Castings Co.* They manufacture zinc and aluminum die castings and also the necessary pattern equipment for the production in iron or other metals in other foundries. Their new officers are as follows: *Fred Kohnle*, president; *R. E. Engle*, treasurer and general manager; *R. N. Lloyd*, secretary; *A. H. Witte*, manager *Di-Cast Div.*, and *Duncan Wilkie*, manager *Di-Mold Division*.

Cohan-Epner Co. Inc., announce their removal to new and larger quarters at 142 W. 14th St., New York City. They have equipped their office and plant with new and modern machinery.

Brown Instrument Co., Philadelphia, Pa., will be one of the exhibitors at the Western Metal Exposition to be held in Los Angeles, Cal., March 21-25th. They will show indicating, recording and automatic

control instruments and auxiliary equipment used in the production, fabrication and heat treatment of all metals.

Despatch Oven Co., 622-9th St., S. E., Minneapolis, Minn., reports the election of the following officers: *A. E. Grapp*, president; *H. L. Grapp*, vice president and general manager; *C. P. Doherty*, vice president and production manager; *G. C. Keys*, vice president and chief engineer; *F. H. Faber*, secretary and sales manager. This company manufactures industrial ovens, dryers and furnaces.

Illinois Zinc Company announces the removal of its New York Office to 630 Fifth Avenue.

The *New Haven Copper Co.*, Seymour, Conn., has filed membership in the Copper and Brass Research Association, 420 Lexington Ave., N. Y., which will be accepted at the next meeting of the Executive Committee. This company was established in 1849 and is a well known manufacturer of sheet, plate, strip and rolled copper for general building and industrial purposes. It also manufactures and markets copper anodes.

M. H. Rhodes, Inc., manufacturer of time devices, have moved their executive and general sales offices from Rockefeller Center, New York, to the factory at 30 Bartholomew Ave., Hartford, Conn.

General Electric Vapor Lamp Co., 410 8th St., Hoboken, N. J., is studying plans for a two-story addition.

Representative modern welding and industrial heating equipments will comprise the *General Electric* exhibit at the Western Metal Congress, to be held March 21-25 in the Pan-American Auditorium, Los Angeles, Calif., under the auspices of the American Society for Metals. G. E. will stage its display in co-operation with the *Victor Equipment Co.*, southern California distributor. Planned to interest the metal-processing and heat-treating trades, much of the display in the G-E Booths (numbers C-41, -45, and -47) will demonstrate actual welding operations. Other exhibits will show industrial parts after treatment by electric-furnace brazing, scale-free hardening, and bright-annealing. The three sizes of G-E forced-convection industrial heaters will be shown, as well as various small "spot" heating units.

Oakite Division Managers Hold Three Day Conference

Three distinct and recent improvements in production and maintenance cleaning practices were subjects of major interest in a three day technical discussion of the Oakite Division Managers of Oakite Products, Inc. at their recent meeting held in the headquarters office, 22 Thames St., New York.

One was the elimination of brushing and mechanical wiping in the removal of insoluble smuts, buffing compounds and pigments from metals preparatory to finishing operations. The second dealt with the safer, easier methods that have been developed for removing hard water scales and rust accumulations from the water jackets of Diesel engines and other similar water cooled equipment. The third covered the development of a new series of cleaning materials that resist chromic acid contamination, making unnecessary the dumping of such tanks at frequent intervals.

Periodic get-togethers of the Oakite Division Managers, and of the entire service organization of nearly 100 men enable an exchange of views on all phases of cleaning, which assures each user of Oakite products being constantly acquainted with every advance in cleaning methods or materials that apply to his work.

Oakite division managers and headquarters office department heads on roof of Oakite Bldg., New York

Metal Products Corporation Earnings

Net Profit Unless Followed by (L) Which Is Loss

	1937	1936
E. I. duPont de Nemours & Co.	$88,031,943	$89,884,449
Mueller Brass Co.	801,891	821,000
National Lead Co.	4,886,951	7,232,530
New Jersey Zinc Co.	7,871,914	5,250,789
Ohio Brass Co.	1,159,842	918,261
Parker Rust-Proof Co.	1,181,179	1,080,646

Metals and Manufactured Weather

By **M. W. SCHWARZ**

Chemical Engineer

With the advent of air conditioning, the subject of heating and ventilating has acquired a new interest for the press and the public, and the industry's important position as a consumer of metals, alloys and finishes is further enhanced. The latest equipment in this field was exhibited at the Fifth International Heating and Ventilating Exposition, Grand Central Palace, New York City, January 24-28, 1938.

The products displayed included water heaters, pumps, valves, gauges, fittings, nozzles, tanks, fans and blowers, air conditioning equipment, registers and grilles, control appliances and instruments, condensers, electrical equipment and specialties, piping, and metals and alloys in various forms. Greater economy and efficiency, automatic control and more attractive designs are emphasized in the new developments.

A trend of special interest to the nonferrous industry is the general replacement of steel by aluminum, aluminum alloys and brass in the fabrication of fans and blowers. Two factors are chiefly responsible for this change; the new materials are more resistant to corrosion than steel, and they are non-sparking.

Both smooth and wrinkle finishes on cabinets were in evidence. Regarding their respective merits, the smooth finish is easier to keep clean, but costs more to apply, and for the best results, a special smooth grade of steel known as "furniture stock" is used for the furnace casing. This finish is baked and sometimes requires refinishing of imperfect portions of the surface. The wrinkle finish, on the other hand, can be applied to ordinary galvanized or black metal and is generally air dried after spraying. Refinishing is not necessary, as slight imperfections in the wrinkle finish are not conspicuous. Greens and reds are now popular in both these finishes. For room cooling cabinets, grain finishes, to harmonize with the furniture of the room, are widely used.

Perfex Corporation uses zinc base die castings for thermostats. Their standard finish, a satin silver effect, consists of a primer coat, color coat and clear lacquer. Aluminum die castings form the bases and cases for a number of the instruments made by *Julien P. Friez and Sons, Inc.*, Baltimore, Maryland. Their thermostats and humidistats are all cadmium plated. For their outdoor instruments, cadmium plated brass or aluminum is generally used, although anodized aluminum is employed in instruments supplied to the Navy. Cadmium plating is also applied by this manufacturer to beryllium copper parts that carry electric current. The *H. A. Wilson Co.*, Newark, N. J. has developed new types of electrical contacts, for use in relays contactors, instruments, electrical appliances and thermostats. Electrical contact rivets which were formerly made of solid silver, are now composite, with a silver face fused to a back and shank of bronze, copper, nickel or steel. Their silver steel laminated contacts can be welded to brackets, instead of using long silver rivets. Among the advantages claimed by the manufacturer are the saving in silver, and the elimination of loose contacts, as the steel back provides for steel-on-steel welding.

Following is a list of exhibitors, users of metals, alloys and metal finishes.

Air Devices Corp., Thermal Units Mfg. Co., Div., 64 E. 25th St., Chicago, Ill.

Airtemp, Inc., 8021 Conant St., Detroit, Mich.

Airtherm Mfg. Co., 1474 S. Vandeventer Ave., St. Louis, Mo.

Alco Valve Co., Inc., 2628 Big Bend, St. Louis, Mo.

American Brass Co., Waterbury, Conn.

American Machine & Metals, Inc., De Bothezat Ventilating Equipment Div., 102 6th Ave., N. Y. C.
American Metal Hose Branch, American Brass Co., Waterbury, Conn.
American Radiator Co., 40 W. 40th St., N. Y. C.
Apex Electrical Mfg. Co., 1100 E. 152nd St., Cleveland, Ohio.
Auer Register Co., 3608 Payne Ave., Cleveland, Ohio.
Automatic Burner Corp., 1823 W. Carroll Ave., Chicago, Ill.
Automatic Products Co., 121 N. Broadway, Milwaukee, Wis.
Automatic Temperature Control, Inc., Logan & Wilhyelm Sts., Philadelphia, Pa.
Autovent Fan & Blower Co., 1807 N. Kostner Ave., Chicago, Ill.
Baker Ice Machine Co. Inc., 1522 Evans St., Omaha, Neb.
Baldor Electric Co., 4350 Duncan Ave., St. Louis, Mo.
Balloffet Diamond Wire Dies Co. Inc., 45 Adams St., Guttenberg, N. J.
Barber-Colman Co., 229 Loomis St., Rockford, Ill.
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Black & Decker Mfg. Co., Towson, Md.
Breuer Electric Mfg. Co., 839 Blackhawk, Chicago, Ill.
Brown Instrument Co., 4494 Wayne Ave., Philadelphia, Pa.
Bryant Heater Co., 17820 St. Clair Ave., Cleveland, Ohio.
Buffalo Forge Co., 465 Broadway, Buffalo, N. Y.
Caloroil Burner Corp., Hartford, Conn.
Carrier Corp., Evergreen & Lyle Sts., Newark, N. J.
Century Electric Co., 1936 Imes St., St. Louis, Mo.
Crowe Name Plate & Mfg. Co., 1765 Grace St., Chicago, Ill.
Davies Air Filter Corp., 392-4th Ave., N. Y. C.
Delco-Frigidaire Conditioning Corp., Dayton, Ohio.
Detroit Lubricator Co., 5842 Trumbull Ave., Detroit, Mich.
Dole Valve Co., 1913 W. Carroll Ave., Chicago, Ill.
Dongan Electric Mfg. Co., 2987 Franklin St., Detroit, Mich.
Eagle-Picher Sales Co., 1935 Temple Bar Bldg., Cincinnati, Ohio.
Economy Pumping Machinery Co., 3435 W. 48th Pl., Chicago, Ill.
Electric Air Heater Co., Div., American Foundry Equipment Co., 408 S. Byrkit St., Mishawaka, Ind.
Electronic Control Corp., 2667 E. Grand Blvd., Detroit, Mich.
Emerson Electric Mfg. Co., 588 N. 21st St., St. Louis, Mo.
Fairbanks, Morse & Co., 906 S. Wabash Ave., Chicago, Ill.
Fulton Sylphon Co., 1010 Cumberland Ave., Knoxville, Tenn.
General Electric Co., Schenectady, N. Y.
General Refrigeration Co., Beloit, Wisc.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Grinnell Co. Inc., W. Exchange St., Providence, R. I.
Hart Oil Burner Corp., Peoria, Ill.
Heil & Co., 3090 W. 106th St., Cleveland, Ohio.
Henry Valve Co. Inc., 1019 N. Spaulding, Chicago, Ill.
Hilo Varnish Corp., 42 Stewart Ave., Brooklyn, N. Y.
Hoffman Specialty Co., Waterbury, Conn.
Hotstream Heater Co., 8007 Grand Ave., Cleveland, Ohio.
Illinois Testing Laboratories, Inc., Hubbard & La Salle Sts., Chicago, Ill.
Imperial Brass Mfg. Co., 1216 W. Harrison St., Chicago, Ill.
Independent Air Filter Co., 213 W. Ohio St., Chicago, Ill.
Independent Register Co., 3751 E. 93rd St., Cleveland, Ohio.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Jenkins Bros., 617 St. Remi St., Montreal, Que., Can.
Kelvinator Div. Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit, Mich.
Kleen-Heet, Inc., 1823 W. Carroll Ave., Chicago, Ill.
Koven & Bro. Inc., L. O., Ogden & Koven Aves., Jersey City, N. J.
Lycoming Mfg. Co., Spencer Heater Div., Williamsport, Pa.
Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J.
May Oil Burner Corp., Maryland Ave. & Oliver St., Baltimore, Md.
Milwaukee Valve Co., 2375 So. Burrell St., Milwaukee, Wisc.
Minneapolis-Honeywell Regulator Co., 2709 4th Ave., S., Minneapolis, Minn.

Motor Wheel Corp., Duo-Therm Div., 712 E. Saginaw St., Lansing, Mich.
Mueller Brass Co., Port Huron, Mich.
Nash Engineering Co., South Norwalk, Conn.
National Radiator Corp., Johnstown, Pa.
National Regulator Co., 2301 N. Knox Ave., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Penn Electric Switch Co., Goshen, Ind.
Perfection Stove Co., 7609 Platt Ave., Cleveland, Ohio.
Renown Stove Co., Owosso, Mich.
Richardson & Boynton Co., 244 Madison Ave., N. Y. C.
Rome-Turney Radiator Co., 1935 Lynch St., Rome, N. Y.
Sangamo Electric Co., 1935 Funk St., Springfield, Ill.
Silent Glow Oil Burner Corp., Hartford, Conn.
Simplex Oil Heating Corp., 30 Church St., N. Y. C.
Spencer Thermostat Co., 40 Forest St., Attleboro, Mass.
Sturtevant Co., B. F., 16 Damon St., Hyde Park, Boston, Mass.
Taco Heaters, Inc., 342 Madison Ave., N. Y. C.
Tork Clock Co. Inc., Mt. Vernon, N. Y.
Torrington Mfg. Co., Torrington, Conn.
Tuthill Pump Co., 134 W. 63rd St., Chicago, Ill.
United States Air Conditioning Corp., 2101 Kennedy St., N. E., Minneapolis, Minn.
United States Register Co., Battle Creek Mich.
Utica Radiator Corp., Utica, N. Y.
Viking Air Conditioning Corp., 1935 Euclid Ave., Cleveland, Ohio.
Viking Pump Co., Cedar Falls, Iowa.
Wagner Electric Corp., 6410 Plymouth Ave., St. Louis, Mo.
Waterloo Register Co., Waterloo, Iowa.
Watts Regulator Co., Lawrence, Mass.
Webster Electric Co., Racine, Wisc.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
Wilson & Co., H. A., 97-105 Chestnut St., Newark, N. J.
Wing Mfg. Co., L. J., 164 W. 14th St., N. Y. C.
Wood Industries, Inc., Gar, 415 Connecticut Ave., Detroit, Mich.
York Ice Mchy. Corp., York, Pa.
York Oil Burner Co., Inc., York, Pa.
Young Radiator Co., Racine, Wisc.

New Electroplating Equipment Manufacturer

The *Blaw-Knox Company*, Pittsburgh, Pa., has announced its entrance into the production of equipment for the electrotinning of steel as well as other continuous electroplating processes through the acquisition of the *Electrochemical Process Company* of Youngstown, Ohio, which will be operated as the *Electrochemical Processes Division* of the *Blaw-Knox Company*. *J. S. Vachtman*, president of the *Electrochemical Processes Company*, will be in charge of the new Division with offices at Groveton, Pa., Post Office Box 1586, Pittsburgh, Pa.

J. S. NACHTMAN

The new Division will also produce equipment for continuously plating tin, nickel, brass, bronze, terne plate, copper, etc., on steel and for the continuous cleaning and pickling of strip, sheet, and wire, including rust-proofing and coloring.

Following graduation from the Colorado School of Mines, *Mr. Nachtman* was associated with the *American Steel & Wire Company* and the *E. W. Bliss Company*. He then became superintendent in charge of electroplating at the plant of the *Thomas Steel Company*, at Warren, Ohio.

Dupont Unifies Electroplating Departments

Formation of the *Electroplating Chemicals Division* is announced by *E. I. duPont de Nemours & Company*, Wilmington, Del. designed to correlate the various manufacturing departments of the company contributing to the plating industry.

The new division, headed by *J. C. Pickard*, has as its aim a unified position from which to service the trade, providing such technical assistance as may be occasioned. The Division will handle all duPont products having a place in the electroplating field, particularly the materials made by the *Grasselli* and the *R & H Chemicals Departments.*

Mr. Pickard until recently was West Coast Manager of the R & H Chemicals Department Pacific Division, located at Los Angeles. Associated with him in the new field as assistant manager is *C. M. Hoff*, formerly of the Plating Division of the Grasselli Chemicals Department.

Metal Market Review

February 18, 1938.

Copper put in a dull and ineffective month. The last report in these columns was a reduction of price to 10c per pound electrolytic delivered Connecticut Valley,

which went into effect on January 28th. Domestic sales were featureless, totalling 3,751 tons, 3,121 tons, 2,951 tons and 3,328 tons making a total of 12,151 tons for the four weeks. Sales for the month of January amounted to 25,543 tons compared with 26,504 in December and 21,035 in November.

Export copper showed a little life occasionally. Exports from the U. S. during December totalled 26,236 tons against 25,315 tons in November. Export prices fluctuated daily but constantly above the domestic figure.

January statistics showed that domestic refined copper stocks rose from 259,351 tons to 299,133 tons; a very disappointing record. Foreign stocks, on the other hand, decreased from 211,844 tons to 206,836 tons.

At this time the foreign market is more active, the price has risen to 10.20 c.i.f.

Zinc also put in a dull month. Beginning the last four-week period at 5c per pound, Prime Western, E. St. Louis, it went through two weeks of very light sales and then on February 7th was reduced to 4.75 at which figure a substantial amount of business was done. Producers were disappointed at the January statistics which showed a production of 48,687 tons, almost as high as the December level, with shipments to consumers during January falling to 24,931 tons. The present stocks of 88,532 tons are the largest since 1935. Prospects at this time very indeterminate, due to weakness abroad.

Tin was also dull and slow. Trading was inactive and the price declined sluggishly, from about 41 to 40c per lb., Straits, and then rising again, the present figure being 41.75. Consuming industries are making a retarded recovery, and dullness, at least for the immediate future is indicated.

Lead followed very much the same course as zinc, holding to its previous price 4.75 per pound E. St. Louis, for about two weeks, dropping to 4.60 early in the second week in February and then to 4.35. Buying improved at the last figure. Sales, week by week, were 1,300 tons, 1,500 tons, 1,000 tons and 3,300 tons, making a total of 7,100 tons, compared to 28,008 tons in the previous 3 weeks.

No prospects for unusual activity in the immediate future.

Silver was consistently quiet and steady in price, with no change in the official quotation of 44¾c per ounce Troy.

Platinum showed a little strength, reviving about the middle of the past four-week period, to $36.00 an ounce against a recent low of $33. No unusual news at this time, however.

Scrap Copper fluctuated with the export market, being up one week and down the next within narrow limits. Brass mills cut their allowance for scrap as far back as January 11th and have not increased it since. Brass and aluminum ingots had a very dull time in spite of price cuts on January 20th. Brass ingot improved slightly in the middle of February but aluminum was still dull.

On February 11th unfilled orders on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to 12,821 net tons against 11,276 net tons on January 1st and 13,936 tons on December 1st.

The combined deliveries of brass and bronze ingots and billets for members in the month of January amounted to 2,774 compared with 3,946 tons in December, 1937, and 3,805 tons in November. The Institute reports the average prices per pound received by its members on commercial grades of six principal mixtures during the 28-day period ending February 18. as follows:

	4 wks. end. Feb. 18	4 wks. end. Jan. 21
80-10-10	(Figures not yet published.)	12.770
78% Metal		10.250
81% Metal		10.595
83% Metal		10.702
85% Metal		11.040
No. 1 Yellow		9.039

Average Prices for Metals

	Jan.
COPPER c/lb. Duty 4c/lb.	
LAKE (del. Conn. Producers' Prices)	10.695
ELECTROLYTIC (del. Conn. Producers' Prices)	10.425
CASTING (f.o.b. ref.)	9.945
ZINC (f.o.b. E. St. Louis) c/lb. Duty 1¾ c/lb.	
Prime Western (for Brass Special add 0.05-0.10)	5.000
TIN (f.o.b. N. Y.) c/lb. Duty Free, Straits	41.518
LEAD (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	4.720
ALUMINUM c/lb. Duty 4 c/lb.	20.000
NICKEL c/lb. Duty 3 c/lb. Electrolytic 99.9%	35.000
ANTIMONY (Ch.) c/lb. Duty 2 c/lb.	15.562
SILVER c/oz. Troy, Duty Free	44.714
PLATINUM $/oz. Troy, Duty Free	34.000
GOLD—Official U. S. Treasury Price	35.000

Supply Prices, February 24, 1938

Anodes

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 2,000 lbs. or more, and subject to changes due to fluctuating metal markets.

COPPER: Cast ..... 19⅝c. per lb.
Electrolytic, full size, 14⅝c. cut to size ..... 14⅝c. per lb.
Rolled oval, straight, 16⅛c.; curved ..... 16⅛c. per lb.

BRASS: Cast ..... 18⅜c. per lb.

ZINC: Cast ..... 11¼c. per lb.

NICKEL: 90-92%, 16″ and over ..... .45 per lb.
95-97%, 16″ " " ..... .46 per lb.
99%+cast, 16″ and over, 47c.; rolled, depolarized, 16″ and over, 48.

SILVER: Rolled silver anodes .999 fine were quoted Feb. 24, from 48c. per Troy ounce upward, depending on quantity.

White Spanish Felt Polishing Wheels

Diameter	Thickness Under ½″	½-15/16″	1-2″	2-3½″	Over 3½″
Under 1″	6.35-6.40	6.20-6.25	6.10-6.15	6.10-6.15	6.35-6.40
1″ to 1 7/16″	5.85	5.70	5.60	5.60	5.85
1½″ to 3 15/16″	5.55	5.35-5.40	5.30-5.35	5.30-5.35	5.60
4-5 15/16″	4.95-5.00	4.70-4.85	4.65-4.75	4.65-4.75	4.95-5.00
6″, 8″ & 9″	3.80-4.25	3.45-3.95	2.45-3.05	2.45-3.00	2.90-3.35
10″ to 18″	3.80-4.25	3.45-3.95	2.45-2.95	2.45-2.85	2.90-3.25
Over 18″	3.80-4.25	3.45-3.95	2.70-3.05	2.70-3.00	2.90-3.35

Prices above are for less than 50 lb. For 50 to 99 lb. deduct from 30c per lb. to 5% from list; for 100 lb. and over deduct from 50c per lb. to 10%.

ODD DIAMETERS: (7″ & 11″ to 17″). Less than 50 lb. add 40c per lb. to above "Even Diameters" list. 50 lb. or over—all one size and consistency and in one shipment—same as "Even Diameters" list above.

On grey Mexican wheels deduct 10c per lb. from above prices.

Cotton Buffs

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16″ 20 ply 84/92 Unbleached	$75.24
14″ 20 ply 84/92 Unbleached	57.67
12″ 20 ply 84/92 Unbleached	43.28
16″ 20 ply 80/92 Unbleached	63.28
14″ 20 ply 80/92 Unbleached	48.57
12″ 20 ply 80/92 Unbleached	36.52
16″ 20 ply 64/68 Unbleached	59.69
14″ 20 ply 64/68 Unbleached	45.84
12″ 20 ply 64/68 Unbleached	34.49

⅜″ Sewed Buffs, per lb., bleached or unbleached 54c to 90c

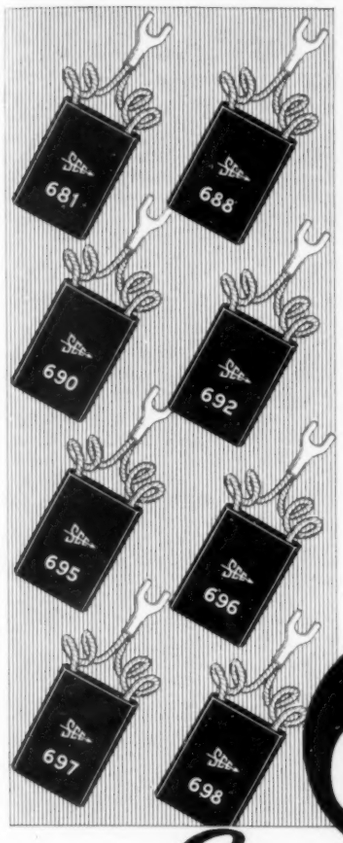
Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P. l.c.l. Drums	lb.	.06¼
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 100 lb. and 400 lb. drums		.16¾-.17¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.027
Hydrochloric, C. P., 20 deg., carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07½
Sulphuric, 66 deg., carboys	lb.	.02½
Alocohol—Butyl, drums (f.o.b. destination)	lb.	.10-.10½
Denatured, carloads (f.o.b. prod. pts.)	gal.	.35-.40
Alum—Lump, barrels	lb.	.0340-.0365
Powdered, barrels	lb.	.0355-.0380
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05¼
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0255-.0305
Cadmium oxide, 50 to 1,000 lbs.	lb.	1.35
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05¾-.06
Chrome, Green, commercial, bbls.	lb.	.21
Chromic Sulphate, drums	lb.	.26¼
*Copper—Acetate (Verdigris)	lb.	.25
Carbonate, 53/55% cu., bbls.	lb.	.14½-.15½
Cyanide (100 lb. kgs.)	lb.	.37
Sulphate, tech., crystals, bbls.	lb.	.052
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour (Turkish)	lb.	.07
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
*Gold Cyanide, Potassium 41%		$15.45
*Gold Cyanide, Sodium 46%		$17.10
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.016
Lead—Acetate (Sugar of Lead), bbls.	lb.	.11-.13¾
Oxide (Litharge), bbls.	lb.	.12½
Lime Compositions for Nickel	lb.	.09½-.11
Lime Compositions for Brass	lb.	.09½-.11
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums l.c.l.	gal.	.40½
Nickel—Carbonate, dry bbls.	lb.	.36-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅝
Potassium—Bichromate, casks (crystals)	lb.	.09⅛
Carbonate, 98-100%	lb.	.06⅜
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.03
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.36½
Cyanide, 100 oz. lots	oz.	.44
Nitrate, 100 ounce lots	oz.	.31½
Soda Ash, 58%, bbls.	lb.	.0235
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15
Nitrate, tech., bbls.	lb.	.029
Phosphate, tribasic, tech., bbls.	lb.	.03
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.28-.31
Sulphocyanide, drums	lb.	.30-.35
Sulphur (Brimstone), bbls.	lb.	.02¾
*Tin Chloride, 100 lb. kegs	lb.	.34½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
White Silica Compositions for Brass	lb.	.07½-.10
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.13
Cyanide (100 lb. kegs)	lb.	.36
Chloride, drums, bbls.	lb.	.065
Sulphate, bbls.	lb.	.0405

*Subject to fluctuations in metal prices.

Metal Prices on page 162.



SERIES 600

..FOR *Easy* CHOICE

The easiest way is not always the best way, but when it becomes also the best way, that's progress indeed. In plating generator brushes, you will find in SPEER Series 600 metal graphite brushes, eight types that will meet the requirements of all but very few machines in service today. This group provides a wide range of characteristics with grades for any application.

For the exceptional cases requiring special brush characteristics not available in this group, SPEER offers many other grades of high quality brushes. Research and development never cease in the SPEER organization.

You can test SPEER brushes in your plant under any conditions you choose by simply letting SPEER engineers study your applications and, based on 40 years' experience, recommend the grade that's best for you. Write and we will arrange details to suit your convenience.

Data Bulletin No. 40 sent on request.

SPEER CARBON COMPANY
ST. MARYS, PA.

SERIES 600 SPEER BRUSHES

8064 A

Besplate
NICKEL ANODES

ARE QUALITY PRODUCTS . . .

LEADERS in the Nickel Plating Industry have standardized on McGean Besplate 99% Nickel Anodes — Because

1. Cathode Deposits are smoother
2. Anode corrosion is excellent
3. Less frequent filtering of solution required

◆◆◆◆◆

We Also Offer

Genuine Rolled Oval
Depolarized Nickel Anodes

◆◆◆◆◆

From our complete line of Anodes and Plating Chemicals we call your attention to the following.

ANODES

Nickel (all percentages)	Tin
Copper	Brass
Cadmium	Zinc

CHEMICALS

Nickel Salts	Copper Sulphate
Nickel Chloride	Copper Cyanide
Nickel Carbonate	Copper Carbonate
Chromic Acid	Cadmium Oxide

Manufactured by

THE McGEAN CHEMICAL COMPANY
CLEVELAND, OHIO

McGEAN CHEMICALS

Metal Prices, February 24, 1938

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

New Metals

COPPER: Lake, 10.125, Electrolytic, 10.00, Casting, 9.525.
ZINC: Prime Western, 4.75. Brass Special, 4.85.
TIN: Straits, 42.15. LEAD: 4.35.
ALUMINUM: 20. ANTIMONY, Ch. 15.875.
NICKEL: Shot, 36. Elec., 35.
QUICKSILVER: Flasks, 75 lbs., $77-78. BISMUTH, $1.00.
CADMIUM, $1.35. SILVER, Troy oz., official price, N. Y., Feb. 24, 44¾c.
GOLD: Oz. Troy, Official U. S. Treasury price $35.00.
SCRAP GOLD, 6¾c. per pennyweight per karat, dealers' quotation.
PLATINUM, oz. Troy $36.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

Ingot Metals and Alloys

	Cents lb.	U. S. Import Duty	U. S. Import Tax*
No. 1 Yellow Brass	8.50	None	4c. lb.[1]
85-5-5-5	10.25	None	4c. lb.[1]
88-10-2	13.75	None	4c. lb.[1]
80-10-10	12	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	10.50	None	4c. lb.[1]
Aluminum Bronze	14.75	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a. v.	None
Nickel Silver (12% Ni)	12.50	20% a. v.	4c. lb.[1]
Nickel Silver (15% Ni)	14.75	20% a. v.	4c. lb.[1]
No. 12 Aluminum	16.25-19	4c. lb.	None
Manganese Copper, Grade A (30%)	23-28	25% a. v.	3c. lb.[1]
Phosphor Copper, 10%	15.00	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	16.00	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	21.50	45% a. v.	4c. lb.[1]
Phosphor Tin, no guarantee	50-60	None	None
Iridium Platinum, 5% (Nominal)	$38-40	None	None
Iridium Platinum, 10% (Nominal)	$40-42	None	None

*** Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.**
[1] On copper content. [2] On total weight. "a. v." means ad valorem.

Old Metals

Dealers' buying prices, wholesale quantities:	Cents. lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6¾ to 6⅞	Free	4c. per pound on copper content
Light copper	5⅞ to 6⅛	Free	
Heavy yellow brass	4½ to 4⅝	Free	
Light brass	3¼ to 3½	Free	
No. 1 composition	6⅜ to 6⅝	Free	
Composition turnings	5⅝ to 5⅞	Free	
Heavy soft lead	3¼ to 3½	2⅛c. lb.	None
Old zinc	2¼ to 2½	1½c. lb.	
New zinc clips	3 to 3⅛	1½c. lb.	
Aluminum clips (new, soft)	13½ to 14	4c. lb.	
Scrap aluminum, cast	8½ to 9	4c. lb.	
Aluminum borings—turnings	6½ to 6¾	4c. lb.	
No. 1 pewter	20 to 22	Free	
Electrotype	4 to 4¼	2⅛c. lb.*	
Nickel anodes	29 to 30	10%	
Nickel clips, new	30 to 31	10%	
Monel scrap	7½ to 13½	10% av.	

*** On lead content.**

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since Jan. 28, 1938. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

Copper Material

	Net base per lb.	Duty*
Sheet, hot rolled	18⅛c.	2½c. lb.
Bare wire, soft, less than carloads	14⅛c.	25% a. v.
Seamless tubing	18⅝c.	7c. lb.

*** Each of the above subject to import tax of 4c. lb. in addition to duty under Revenue Act of 1932.**

Nickel Silver

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	26½c.	10% Quality	29⅛c.
15% Quality	28⅝c.	15% Quality	33½c.
18% Quality	29⅞c.	18% Quality	36¾c.

Brass and Bronze Material

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty
Sheet	16⅝c.	17⅜c.	18¼	4c. lb.
Wire	16⅞c.	17⅝c.	18⅜	20%
Rod	12⅝c.	17⅝c.	18⅜	4c. lb.
Angles, channels	25⅛c.	25⅞c.	26¾	12c. lb.
Seamless tubing	19⅜c.	19⅞c.	20⅝	8c. lb.
Open seam tubing	25⅛c.	25⅞c.	26¾	20% a. v.

U. S. Import Tax 4c. lb. on copper content.

Tobin Bronze and Muntz Metal

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	18½c.
Muntz or Yellow Rectangular and other sheathing	19⅞c.
Muntz or Yellow Metal Rod	16 c.

Aluminum Sheet and Coil

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, carload lots, per lb.	33.00c.
Aluminum coils, 24 ga., base price, carload lots, per lb.	28.50c

Rolled Nickel Sheet and Rod

Net Base Prices

Cold Drawn Rods	50c.	Standard Cold Rolled Sheet	49c.
Hot Rolled Rods	45c.		

Monel Metal Sheet and Rod

Hot Rolled Rods (base)	35c.	No. 35 Sheets (base)	37c.
Cold Drawn Rods (base)	40c.	Std. Cold Rolled Sheets (base)	39c.

Silver Sheet

Rolled sterling silver (Feb. 24) 47c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

Zinc and Lead Sheet

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots standard sizes and gauges, at mill, less 7 per cent discount	10.00	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' prices)	11.00	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' prices)	15.00	2c. lb.
Full Lead Sheet (base price)	7.50	2⅝c. lb.
Cut Lead Sheet (base price)	7.75	2⅝c. lb.

Block Tin, Pewter and Britannia Sheet

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 160.